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Equity Market Integration in the Euro Area

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BIOGRAPHICAL NOTE

José João Constantino Oliveira Dolores was born on 22nd August 1986 in Santa Marta de Penaguião, Portugal. In 2004, he was admitted to the Faculty of Economics of the University of Porto where he graduated in Economics in 2008. Afterwards, he was admitted to Católica Porto Business School where he obtained his MSc degree in Finance in 2011 and simultaneously, during this period, started his professional experience as guest assistant, teaching workshops in the "International Financial Economics" course and "Money and Financial Markets" course, both from the Economics and Management bachelor degrees.

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ABSTRACT

This thesis proposes a multi approach to financial market integration through the perspective of investors and their portfolios. Financial integration has been one of the main goals of the European community after the Treaty of Rome. Financial market integration is a critical aspect of financial integration. Therefore, it is important to assess how the level of financial market integration has evolved in recent years.

Our research aims to investigate the behavior of investment funds in order to better understand the level and drivers of financial market integration in Europe and how it evolved through time in recent years since the euro introduction.

We start by proposing a new return-based approach to measure the degree of financial market integration. We examine the geographic investment style of equity investment funds that invested in the euro area over time. Specifically, we use a methodology based on the style analysis model proposed by Sharpe (1992) to measure the exposure of funds to euro and non-euro equity market benchmarks over time.

We also analyze the evolution of the allocation strategy of European equity investment funds, by examining their portfolio holdings. Considering the home (and euro) bias as proxy of financial market integration, we propose a model that accounts for the main drivers of the allocation bias over time and across funds. Finally, we investigate cross-border corporate ownership of European equity investment funds.

Results support the evidence reported by previous studies that financial market integration improved after the euro introduction followed by a partial setback just after the outbreak of the last financial crisis. Our results suggest a lower degree of integration in European equity markets outside the euro area. Yet the evidence also supports different levels of integration within the euro area. The results hold both for the return-based and the holdings-based approaches.

RESUMO

Esta tese propõe uma abordagem multi-metodológica à integração dos mercados financeiros através da perspetiva dos investidores e das suas carteiras. A integração financeira tem sido um dos principais objetivos da comunidade Europeia após o Tratado de Roma. A integração dos mercados financeiros é um aspeto crítico da integração financeira. Assim, é importante aferir como tem evoluído o nível de integração dos mercados financeiros nos últimos anos.

A nossa investigação visa o comportamento dos fundos de investimento com o propósito de melhor perceber o nível e os determinantes da integração dos mercados financeiros na Europa e como esta tem evoluído, nos últimos anos, após a introdução do euro.

Iniciamos propondo uma nova abordagem com um modelo de retornos que mede o grau de integração dos mercados financeiros. Analisamos o estilo de investimento geográfico de fundos de investimentos em ações que investem na área euro ao longo do tempo. Em concreto, seguimos uma metodologia baseada no modelo de análise de estudo estilo proposta por Sharpe (1992) para medir a exposição dos fundos a *benchmarks* de ações euro e não euro ao longo do tempo.

Adicionalmente, analisamos a evolução da estratégia de alocação de fundos de investimento europeus de ações, através das suas carteiras. Considerando o enviesamento doméstico (e euro) como proxy da integração dos mercados financeiros, propomos um modelo que considera os principais determinantes dos enviesamentos e da alocação através do tempo e fundos. Por último, investigamos a detenção transfronteiriça de fundos de investimento europeus em ações.

Os resultados suportam a evidência, já reportada pelos estudos anteriores, de que a integração dos mercados financeiros melhorou após a introdução do euro, seguido por um revés parcial logo após a eclosão da última crise financeira. Os nossos resultados sugerem um menor nível de integração financeira nos mercados acionistas externos à área euro. Contudo, a evidência também sustenta a existência de níveis distintos de integração

dentro da área euro. Os resultados são válidos tanto para a abordagem de retornos como para a abordagem de detenção.

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LIST OF ABREVIATIONS

ADR	American Depositary Receipts
CAPM	Capital Asset Pricing Model
CPIS	Coordinated Portfolio Investment Survey
EA	Euro Area
ECB	European Central Bank
EGLS	Estimated Generalized Least Squares
EMU	European Monetary Union
FB	Foreign Bias
GDP	Gross Domestic Product
HB	Home Bias
ICAPM	International Capital Asset Pricing Model
IMF	International Monetary Fund
NAV	Net Asset Value
OLS	Ordinary Least Squares
QO	Quadratic Optimization
RBSA	Return-Based Style Analysis
TNA	Total Net Assets
UK	United Kingdom
US	United States
USD	United States Dollars
VaR	Value at Risk
VIF	Variance Inflation Factor

1. INTRODUCTION

The aim of this thesis is to contribute to a better understanding of financial market integration in Europe. To understand the dynamics of financial market integration in recent times, we study the behavior European equity investment funds by examining their portfolio returns and their domestic and cross-border holdings and corporate ownership preferences.

This chapter introduces the topic of our research. Section 1.1 presents the motivation and importance of the topic and document the behavior of cross-border flows over the period 2001-2017. Section 1.2 provides a brief but comprehensive review of the related literature. We summon up the seminal studies, and the approaches proposed therein to measure financial market integration, from an asset pricing or an holdings' perspective. In particular, we review the studies on home bias. Section 1.3 presents the purpose and the contribution of the research and an overview of our results.

1.1 Motivation and Importance

Economic and financial integration is one of the policy targets underlying the construction of the European project. The first step was taken in 1957 with the Treaty of Rome which established the creation of the common market as a central objective, only possible through the elimination of the barriers to capital movements (Wojcik, 2002).

Financial integration is critical for the future of European countries and regions: increasing capital flows across countries lead to higher cross-border holdings of financial assets broadening the investor base and therefore improving international risk sharing. At the same time, international capital flows raise accounting, disclosure, and corporate governance standards. Ultimately, financial integration enhances the efficiency of the financial system in capital allocation and therefore economic growth (Babecky et al., 2013, Wojcik, 2002). Notwithstanding, some authors provide evidence of negative impacts of the increase in financial integration, particularly in times of financial instability

(Mendoza et al., 2009, Babecky et al., 2013). The intensification process of globalization increases the interconnection between markets, increasing the sensitivity of domestic markets to global shocks, financial crises are no longer restricted to regional borders and contagion across markets may lead to greater financial instability. Furthermore, there could be insufficient access to funding due to capital concentration, resulting in inappropriate allocation of capital (Babecky et al., 2013).

Despite all the acknowledged benefits and importance given to capital market integration, several warnings have been raised in Europe. The first was the report that has emerged from the Committee of Wise Men, set up by the European Commission in the beginning of 2001, commonly known as Lamfalussy report (Wojcik, 2002). The report essentially called for more reforms at a regulatory basis but the lack of consensus about the level of integration that had been reached was evident. In part, this could be justified by the fact that, in practice and in the literature, there are very different ways to define and measure financial market integration.

Since the establishment of the euro area, several studies have assessed the impact of the monetary union on the integration of the capital markets. Examples are Fratzscher (2002), Guiso et al. (2004), Kim et al. (2006), Bartram et al. (2007), Cappiello et al. (2010), De Santis (2010) and Haselmann and Herwartz (2010). Regardless of the approach and measure used to proxy financial market integration, the evidence is rather consensual and suggests a positive impact of the introduction of the euro. Along with the euro introduction, the removal of formal restrictions to capital flows and the creation of common trading platforms and market infrastructures boosted liquidity and facilitated the financial integration process and cross-border portfolio flows (Adam et al., 2002, De Santis and Gérard, 2009). Yet, all these factors seem to produce portfolio allocations biased in favor of euro assets. To fully benefit from international diversification, investors would rather increase their holdings in non-domestic euro area assets (De Santis and Gérard, 2009, Vermeulen, 2013, Baele et al., 2004). Grossman and Leblond (2011) also conclude that there is increased financial integration in the euro area, but the effects appear to be weaker than initially expected, due mainly to the significant differences across member countries in terms of institutional structures, in which corporate

governance rules and practices may play a major role. These differences seem to deter cross-border holdings and international risk sharing.

Later, in 2008, the European Central Bank (ECB) issued additional warnings about integration in Europe. Although recognizing a considerable progress over the previous decade, mainly driven by the introduction of the euro, the ECB mentioned that the level of integration was far from the ideal. The ECB reported high level of segmentation in the infrastructures of the European securities markets, namely in equity markets.

All those warnings about the effects of incomplete financial integration have proved to be important over the last two decades. Europe and in particular the euro area, suffered several structural changes of which the introduction of the common currency and the great financial crisis[1] are the most important (Baele et al., 2004, Bremus and Fratzscher, 2015). As stated by Kalemli-Ozcan (2016), worse than the level of segmentation is the asymmetry between European countries which leads to irregular reaction to shocks. The lack of bank and fiscal union increases the vulnerability of European countries to adverse shocks (Kalemli-Ozcan, 2016). The 2016 report from the European Central Bank (2016) shows that the financial and sovereign debt crises led to substantial financial fragmentation, a process that has not been reverted so far. This lack of integration, along with a common currency and monetary policy, is itself a cause of structural issues inside the euro area increasing the negative effects of shocks and establishing a barrier to growth and financial efficiency (Gal, 2015). As demonstrated by the warnings issued in the previously mentioned studies, the introduction of a common currency was not, for itself, a sufficient integration tool (Gal, 2015).

Due to the importance of financial market integration for the euro area, the ECB has been disclosing a set of indicators proxying financial integration and that are accompanied, since 2007, by an annual progress report on financial integration. The ECB constructs two composite indicators, a price-based and a quantity-based indicator, allowing a continuous monitoring of financial integration. The price-based financial

[1] All mentions to financial crisis on this thesis reports to the 2007-08 global financial crisis which started with the subprime crisis at the end of 2007 and then developed into a global crisis with Lehman Brothers default on September 2008.

market integration indicator is computed using a selection of ten indicators that cover the main capital markets: money, bond, equity and banking markets. The quantity-based financial market integration is computed from a portfolio perspective, based on cross-border holdings. The composite indicators range from zero (full segmentation) to one (full integration) and are used as guidance for the ECB initiatives and policy definition. As shown in Figure 1.1, the last report of the European Central Bank (2018), provides an extensive overview of the financial market integration development since 1Q95.

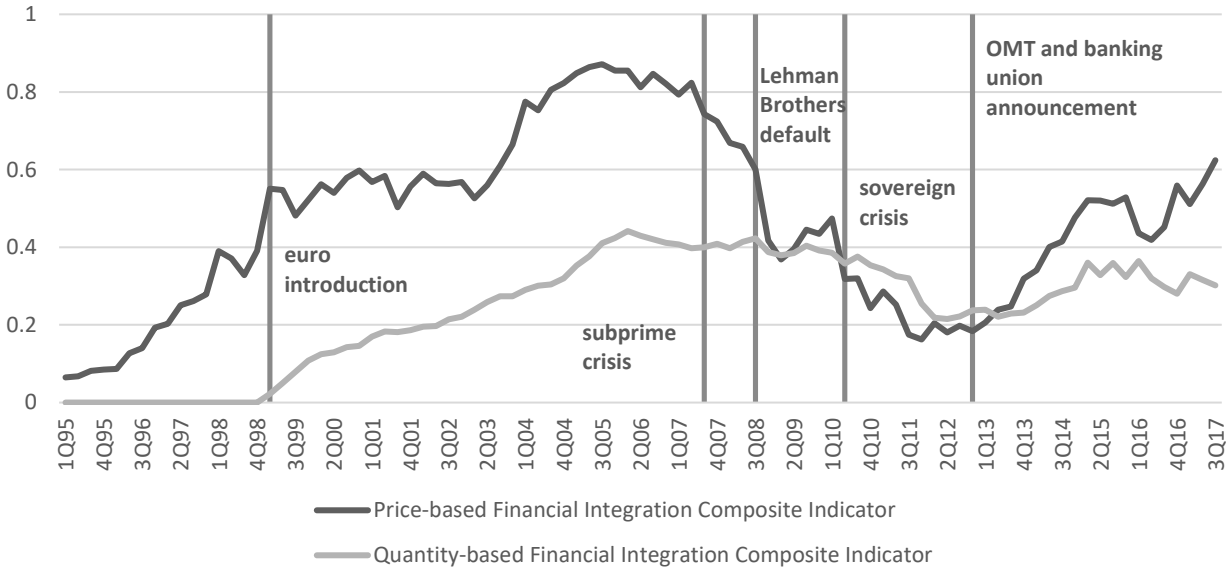


Figure 1.1 - Price-based and Quantity-Based Financial Market Integration Composite Indicators

Source: European Central Bank (2018)

Figure 1.1 highlights the relevance of the warnings issued over the last decades and already mentioned. After a strong reinforcement of financial integration is clear after the euro introduction in 1999, there is a setback during the period of the most recent financial crisis. The first negative impact occurs after the subprime crisis at the end of 2007 but the Lehman Brothers default on September 2008 precipitated the financial market integration to levels similar to that observed before the euro introduction. In 2012, in response to the financial crisis, the ECB announced the Banking Union and Outright Monetary Transactions (OMT). As shown in Figure 1.1, since then, there is an upward impact on financial market integration.

One of the main motivations of our study is to better understand the dynamics of financial market integration in recent times and how those fluctuations were reflected on equity investors' cross border holdings.

Due to the changes in financial market integration level over the last decades, the ECB has established the goals of risk reduction and improvement of cross-country risk sharing. Along with that, ECB is also looking to complete the banking union and reinforce the capital market union as key initiatives to strengthen the level of financial integration in future years. All initiatives mentioned are strictly connected, as capital market union will improve cross-border financial risk sharing, leading to smother effects of economic cycles. Furthermore, capital market union will only be possible with more efficient and resilient market infrastructures which are important facilitators of cross-border flows.

Considering that financial integration is associated with the intensification of cross-border flows, a first macro scrutiny is possible through the dataset provided by the International Monetary Fund (IMF), Coordinated Portfolio Investment Survey (CPIS). CPIS is a voluntary data collection that gathers information of cross-border holdings of equities and debt securities. A first experimental survey was conducted in 1997, yet only a limited number of countries responded, so any conclusion based on this year should take that into account as mentioned, e.g., by Galstyan and Lane (2010). Since 2001, IMF reported this data uninterruptedly.

As mentioned before, the euro introduction had a positive impact on cross-border flows and thereafter plausibly on financial market integration as shown in Figure 1.2.

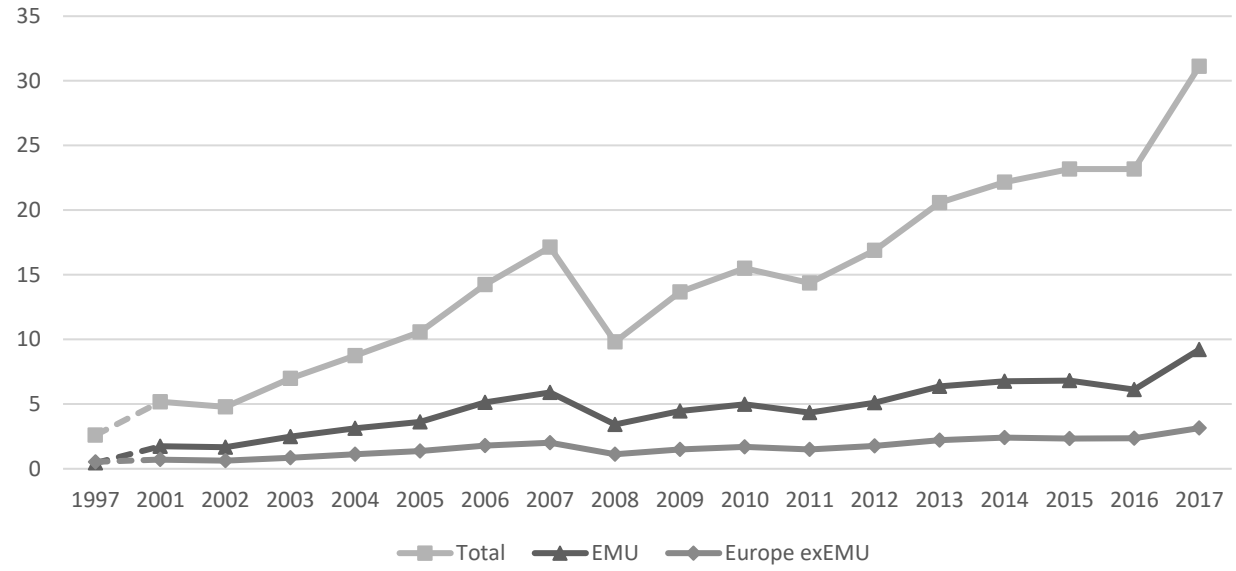


Figure 1.2 - Cross-border Equity Investment

Source: International Monetary Fund (2018)

Since 2001, the world cross-border flows increased in an expressive average annual rate superior to 30% from USD 5 trillion to more than USD 31 trillion. That is even more remarkable, considering the clear setback in the financial crisis period with a decrease of over 40% between 2007 and 2008. It took almost 6 years to reach the 2007 levels. The cross-border investment originated in the euro area countries shows an increase slightly above average, with better figures in the first year after the euro introduction.

Despite the expressive increase of cross-border flows, on average, the weight of EMU equities in European countries' portfolios has stayed relatively stable over the period 2001-2017 as shown in Table 1.1. Yet, for many countries, e.g., Spain, Italy or Greece, there was a relevant increase:

Country	1997	2001	2007	2008	2017
France	39%	51%	50%	51%	66%
Germany	NA	60%	71%	79%	70%
Spain	46%	54%	72%	69%	83%
Portugal	55%	66%	71%	69%	72%
Italy	56%	64%	83%	87%	90%
Greece	NA	54%	44%	35%	92%
Euro Area	**43%**	**48%**	**51%**	**53%**	**52%**
United Kingdom	35%	42%	29%	29%	27%
Denmark	32%	25%	28%	26%	29%
Sweden	41%	33%	43%	42%	37%
Non Euro Area (Europe)	**36%**	**39%**	**32%**	**32%**	**30%**
Japan	17%	17%	20%	17%	13%
United States (US)	31%	29%	25%	24%	22%
Canada	12%	13%	16%	14%	10%
Total Average	**31%**	**35%**	**34%**	**34%**	**30%**

Table 1.1 - Weight of EMU Equities in Selected Countries' Portfolios by Country/Region

Source: International Monetary Fund (2018)

Considering the amount invested in foreign assets, EMU equities represent on average 30% of that amount. Yet there are opposite behaviors for investors based inside the Euro Area and investors based in other European countries. Those based inside the Euro Area increase their investment in equities from other EMU countries since 1997, to a level as high as 90%, as it is the case of Italy and Greece in 2017. Investors based in other European countries reduced the weight of EMU equities over the period to levels close to 30%, close to the level observed for investors based outside Europe, e.g., investors based in the United States (US). This different behavior for investors based inside and outside the EMU could be interpreted as a first sign of imperfect financial integration even inside Europe. In countries outside Europe, the behavior is relatively stable, slightly decreasing over the period.

Table 1.2 and Table 1.3 show the structure of the different country portfolios, with the weight of cross-border equity holdings:

2001

Country	Euro Area	Non EA	USA	JPN	Other
France	51%	14%	21%	4%	11%
Germany	60%	13%	18%	2%	8%
Spain	54%	19%	15%	6%	6%
Portugal	66%	7%	13%	1%	13%
Italy	64%	7%	16%	4%	8%
Greece	54%	19%	20%	1%	6%
Euro Area	**48%**	**13%**	**23%**	**4%**	**12%**
United Kingdom	42%	4%	23%	9%	22%
Denmark	25%	24%	31%	5%	15%
Sweden	33%	16%	37%	5%	9%
Non Euro Area (Europe)	**39%**	**7%**	**26%**	**8%**	**20%**
Japan (JPN)	17%	14%	54%	-	15%
United States (US)	29%	24%	-	11%	37%
Canada	13%	11%	58%	6%	11%
Total Average	**35%**	**16%**	**20%**	**6%**	**23%**

Table 1.2 - Weight of Cross-border Equity in 2001

Source: International Monetary Fund (2018)

2017

Country	Euro Area	Non EA	USA	JPN	Other
France	66%	8%	11%	4%	12%
Germany	70%	6%	12%	2%	10%
Spain	83%	6%	5%	1%	5%
Portugal	72%	5%	10%	2%	11%
Italy	90%	4%	3%	0%	2%
Greece	92%	1%	4%	0%	3%
Euro Area	**52%**	**8%**	**19%**	**3%**	**18%**
United Kingdom	27%	2%	35%	6%	30%
Denmark	29%	11%	38%	4%	19%
Sweden	37%	9%	30%	4%	20%
Non Euro Area (Europe)	**30%**	**4%**	**34%**	**6%**	**27%**
Japan (JPN)	13%	4%	30%	-	53%
United States (US)	22%	15%	-	10%	53%
Canada	10%	7%	59%	5%	18%
Total Average	**30%**	**9%**	**19%**	**6%**	**36%**

Table 1.3 - Weight of Cross-border Equity in 2017

Source: International Monetary Fund (2018)

Investors based inside the Euro Area expand their weight on EMU equities by reducing their exposure especially to European (non-euro area) equities but also to US and Japanese equities. Considering that the euro introduction might have reduced the diversification gains inside the euro area, the final diversification benefits are controversial. On the other hand, investors based in other European countries (non-euro area) reinforced their exposure to US equities.

These figures show, in a macro perspective, that investors have material different portfolio allocations and allocation shifts depending on their location. These results suggest imperfect integration for these countries.

From an asset perspective, the relative weight of European equities has decreased substantially since 2001. For US and Japanese investors, the weight of European equities decreased, on average, 15 percentage points (pp) between 2001 and 2017. This apparently decrease of attractiveness of European equities is in part justified by the decrease of the weight of these equities in the world market capitalization, around 5 pp between 2001 and 2017 (World Bank).

1.2 Literature Review

Financial Market Integration is defined, as in most previous studies, using the "The Law of One Price" principle that states that: (i) two assets that have identical risk and return should be priced identically; and that (ii) two economic agents with identical utility functions should have similar portfolio allocations (Babecky et al., 2013, Baele et al., 2004, Adam et al., 2002).

From an asset pricing perspective, in a full financial markets integration scenario, returns would be generated by a single asset pricing rule and would be influenced only by global systematic risk factors (see, e.g., Adler and Dumas (1983), Errunza and Losq (1985) and Flood and Rose (2005) among others). However, direct barriers to free capital mobility prevent full financial market integration. Even within the same currency area, the existence of indirect barriers, such as tax and legal matters or accounting and auditing differences, impact the level of integration (Adam et al., 2002, Hartmann et al., 2003).

From an investor's perspective, we should find a homogeneous allocation across investors domiciled in different countries. Yet, previous literature is quite consensual about the over preference for domestic assets, i.e., for stocks of companies based in the same country of the investor (Balta and Delgado, 2009, Schoenmaker and Bosch, 2008, Baele et al., 2007, Levy and Levy, 2014, Chan et al., 2009). That over preference for home assets, typically known as Home Bias (HB), is indicative of some degree of segmentation. Balta and Delgado (2009), e.g., use HB as a proxy of integration, and document increased levels of integration in the euro area over the last 20 to 25 years, even if heterogeneous across countries. Their evidence suggests further that the policies applied since the Lamfalussy report had different impacts in the euro area countries.

Cooper et al. (2013) characterized HB as the strongest and more persistence empirical phenomenon in finance that has puzzled academics for decades. Investors hold more domestic equities than any optimal choice theory could ever justify (Cooper et al., 2013). Cooper et al. (2013) report that on average, the gap between the share of domestic equities and the weight of that country in the world market portfolio is about 75 percentage points.

HB is not the only geographic investment phenomenon described by previous literature. Portes and Rey (2005) show that investors do not only overinvest in home stocks but also overinvest in markets that are geographically close to their domestic markets. This preference for local stocks was initially described and denominated "local bias" by Coval and Moskowitz (1999). Additionally, another phenomenon is also commonly considered: Foreign Bias (FB) to describe the consequent relative underweight in stocks issued in markets more distant to home (Cooper et al., 2018).

The over preference for domestic assets is irrational according to the finance theory. Investors lose the benefits of international diversification, which would allow them to maximize return for a determined level of risk (Cooper and Kaplanis, 1986, French and Poterba, 1991, Schoenmaker and Bosch, 2008, Balta and Delgado, 2009). Essentially, finance theory assumes that the opportunity cost of under-diversification is

clearly superior to any benefit that could be driven by concentrating the portfolio in domestic equity market (Goetzmann and Kumar, 2008, Cooper et al., 2013)[2].

However, some extant literature states that this position ignores the possibility of international diversification at home. Errunza et al. (1999) show that it is possible to exploit diversification opportunities at home through the investment in domestically traded multinationals, closed-end country funds and American depositary Receipts (ADRs). Investors could mimic foreign market indices and achieve a portfolio that is internationally efficient using those domestic instruments (Errunza et al., 1999, Cooper et al., 2013).

The typical approach to measure HB is to compare the actual allocation with the optimal portfolio weight (Cooper et al., 2013). However, choosing the correct benchmark for the optimal portfolio could be challenging. Most of the previous literature follows the approach of determining the benchmark weights through an asset pricing model. The model commonly used is the CAPM or its international version (ICAPM) proposed by Solnik (1974) and Sercu (1980) (Cooper et al., 2013). Both models assume identical investment opportunities and that there are no transaction costs or taxes, so all investors should hold the world market portfolio. In this portfolio, the weight of each asset is equal to the relative share of the country in the world market capitalization (Cooper et al., 2013). After choosing the benchmarks, the simplest and more intuitive way to measure HB is the one followed by, e.g., Cooper and Kaplanis (1986) or Brealey et al. (1999) in which HB is given by the difference between actual and optimal allocation. Other and more complex approaches to measure HB emerged in more recent years. It is also worth highlighting the log-ratio scaled approach, used by Chan et al. (2005) and Lau et al. (2010), which enables to smooth larger biases, or the more recent measure advocated by Cooper et al. (2013) who proposes a logistic transformation of standardized bias to reduce the worst forms of heteroscedasticity. Finally, recovering the two related phenomena of Home and Foreign Bias other approaches, which focus on distance and gravity models, emerged relating HB to distance (Portes and Rey, 2005, Cooper et al., 2018, Floreani and Habib, 2018).

[2] Nevertheless, according to distance models, investors may not take advantage of that diversification given that those gains are surpassed by the distance costs (Tesar and Werner, 1995).

Despite all the different proposals to measure HB, one outcome is common: the evidence is a high level of HB. Several studies try to understand this puzzle and suggest many arguments that could, at least in part, justify it. The arguments stressed by previous literature can be grouped in five main categories: (i) measurement issues; (ii) explicit costs and barriers; (iii) information asymmetries; (iv) corporate governance/transparency and agency differences; and (v) investor preferences (Balta and Delgado, 2009, Schoenmaker and Bosch, 2008, Dahlquist and Robertsson, 2001, Cooper et al., 2013, Levy and Levy, 2014, Mishra, 2015).

The first set concentrates some arguments/doubts about the necessity of hedging for home-country specific risks and investment abroad in order to achieve international diversification. Investors have typically larger exposure to domestic risks such as inflation, real exchange rate and risks from non-tradable goods (Cooper et al., 2013). So, investing in domestic stocks could be merely a way to hedge those risks. As shown by Friend et al. (1976), domestic stocks could be a good solution to hedge inflation risk. On the other hand, as exposed by Errunza et al. (1999) and others, international diversification may be achieved through domestic holdings. All that attained by avoiding international barriers to investment and higher transactions costs.

Explicit costs and barriers are the second group of arguments and one of the earliest explanations to the HB phenomenon (Cooper et al., 2013). Those early studies pointed out a few arguments that could justify the over preference for domestic assets: (i) higher transaction costs for foreigners; (ii) withholding taxes; (iii) restrictions on foreign equity holdings; (iv) risk of expropriation and (v) control of capital flows (Black, 1974, Stulz, 1981, Errunza and Losq, 1985). The consensus about those arguments has never been achieved and a few studies show some contradictory facts. Additionally, some of these barriers could be true in the 80's but have been dismantled since then. Bekaert and Harvey (1995) pointed out that when looking at emerging markets, other barriers could be more relevant. In this case, (i) poor credit ratings; (ii) high and variable inflation; (iii) exchange controls; (iv) poor regulatory and accounting standards and (v) lack of country funds and cross-listed securities might play a major rule.

Information asymmetries is one of the most prevalent arguments raised by previous literature and follows a simple premise; investors prefer domestic stocks because

they perceive them as less risky (Cooper et al., 2013). That perception arises as investors claim to know and understand better the business practices and economic environment. Additionally, this information asymmetry could also be translated into extra costs in order to treat, translate and interpret information disclosed in a foreign language (Grinblatt and Keloharju, 2001). Investing in foreign stocks may lead to increased costs due to different cultures, religions or habits which could reduce the attractiveness to invest abroad (Grinblatt and Keloharju, 2001). The previous studies that focused their study on information asymmetries used frequently proxies to measure it also controlling for other factors such as transaction costs. Based on those studies, the proxies used could be classified in three classes of proximity measures: (i) geographical proximity; (ii) cultural proximity and (iii) economic proximity (Ahearne et al., 2004, Sarkissian, 2004, Chan et al., 2005, Portes and Rey, 2005, Lane and Milesi-Ferretti, 2008, Bekaert and Wang, 2009, Cooper et al., 2018). More recent studies show that even a very small perception of information advantage leads the investor to overinvest severely in domestic assets (Van Nieuwerburgh and Veldkamp, 2009, Andrade and Chhaochharia, 2010). However, if that information advantage is real, we should assume that investors would select their stocks better and consequently show higher returns on their investments. The previous empirical evidence is far from consensual and some studies, e.g., Grinblatt and Keloharju (2001) and Huang and Shiu (2009) proved that foreign investors have higher returns than domestic investors and Seasholes and Zhu (2010) show that portfolios of local stocks do not have outperform global portfolios. In contrast, Malloy (2005) and Bae et al. (2008) show that local analysts outperform foreign analysts. Lastly, Bailey et al. (2006) also show that cross-listings contribute to decrease information asymmetries.

The fourth category of arguments is partially linked to information asymmetry. The main drivers of HB are informal barriers such as lack of transparency, complexity and corporate governance issues at a company level and political risk at a country level (Cooper et al., 2013). At a company level typically, the corporate governance issues could emerge when companies are controlled by an insider shareholder and have limited free float and non-trivial likelihood of private benefits extraction (Shleifer and Vishny, 1997, Dahlquist et al., 2003, Stulz, 2005, Giannetti and Simonov, 2006). As mentioned by Gelos and Wei (2005) both corporate governance and transparency influence international portfolios holdings. Foreigners are less attracted by companies based in countries with

less reliable financial and legal systems, with poor disclosure rules and with ownership structures that are conducive to governance problems (Gelos and Wei, 2005, Cooper et al., 2013). Along with the conflict between insiders and outsiders, there is an extra agency problem, the risk of expropriation (Stulz, 2005). This extra problem also affects international portfolio holdings in three ways: (i) countries with poor governance are conducive to the existence of controlling shareholders; (ii) smaller countries show more exposure to foreign investors and simultaneously investors based in these small countries need to invest abroad; and lastly (iii) countries with higher risk of expropriation have a lower fraction of wealth held by foreigners (Cooper et al., 2013).

Scrutinized the rational explanations for the persistence of HB, a last and with increasing importance category of drivers for HB is based on behavioral finance theory. Psychological factors such as overconfidence, over optimism, familiarity, and patriotism are used to explain investors' behavior (Fox and Tversky, 1995, Tversky and Kahneman, 1991, M. Barber and Odean, 2001, Karlsson and Norden, 2007, Cooper et al., 2013, Solnik and Zuo, 2017). Previous studies demonstrate that investors miscalculate their competence on judging foreign stocks and their overconfidence, leading to an overinvestment in domestic assets based on the perception of information advantage (French and Poterba, 1991, Kilka and Weber, 2000, Dahlquist and Robertsson, 2001, Strong and Xu, 2003, Dorn and Huberman, 2005, Schoenmaker and Bosch, 2008, Balta and Delgado, 2009, Levy and Levy, 2014, Mishra, 2015). However, as mentioned by Strong and Xu (2003) optimism alone does not seem to be sufficient to justify the high level of HB documented.

More common behaviors such as "familiarity bias" or "friendship bias" have also been stressed (Merton, 1987, Huberman, 2001, Berkel, 2004). Huberman (2001) argues that investors prefer to hold stocks from familiar companies, which means domestic ones, and so investing in foreign assets generates a sense of discomfort and fear. Kang and Stulz (1997) reinforce this idea, showing that foreigners prefer large companies which could reflect a familiarity effect. This behavioral trait is somehow linked to the previously mentioned rational argument of information asymmetry: large companies are more well-known and more liquid than smaller companies and it is easier to gather information about those companies, resulting in lower transaction costs (Kang and Stulz, 1997). More

recently another behavioral trait pointed out as a possible driver of HB is patriotism. Morse and Shive (2011) show in countries with higher patriotism level, home bias is more prevalent. Finally, some studies linked HB to a lack of investor sophistication (Goetzmann and Kumar, 2008, Grinblatt and Keloharju, 2001, Karlsson and Norden, 2007).

Other studies have used different approaches to measure financial market integration. For example, Wojcik (2002) analyzes cross-border corporate holdings. Pungulescu (2013) looks at a battery of credit, bond and stock market indicators, as well as indicators based on household and firm decisions. Bekaert et al. (2013) look at industry valuation multiple differentials across markets.

1.3 Purpose, Contribution and Overview of the Results

We aim to improve our understanding of financial market integration by examining the portfolios of institutional investors.

In chapter 2, we propose a new approach to measure financial market integration estimating geographical portfolio shifts during the last decades. We adapt the style investment model proposed by Sharpe (1988, 1992). We replace the original the style asset classes by geographic benchmarks.

We contribute to the literature from a methodological standpoint, by proposing a new approach to measure financial market integration. We adapt a well-established model, used for different purposes, which is easier to apply and not so demanding in terms of data requirements and computational procedures. We show that our approach, although less demanding on data, is as robust as the previous approaches proposed by the existing literature.

We further contribute to the literature by providing an extensive study of financial market integration in Europe and employing both return-based and holdings-based approaches to evaluate financial integration over time and across countries. We assess how financial market integration has evolved since the euro currency introduction in 1999 and how the integration process was affected by the recent financial crisis. Finally our

study is among the first studies to explore and test the corporate insider theory implications for financial market integration.

In chapter 2, we use a new return-based approach with a sample of 2,880 investment funds investing in Europe from March 1999 to December 2013. Our findings show a clear preference for euro area stocks which become less evident after the euro introduction due to the increase of the relative importance of other non-euro factors. That pattern suffered a setback with the advent of the financial crisis, with the euro area factor regaining importance. Those findings reinforce the conclusions of previous studies that claim an intensification of the financial integration following the euro introduction, especially inside the euro area. However, we also find a reversion of the level achieved caused by the financial crisis. Additionally, when we split our dataset by fund location, we find different reactions and behaviors which also suggest partial financial segmentation, even inside the euro area.

In chapters 3 and 4, we examine the portfolio holdings of a sample of European mutual funds. By looking at institutional investors' portfolio holdings, we gain a better understanding of the geographical shifts on their allocation strategy and investment destinations, as well as of corporate ownership decisions.

In chapter 3, we use an holdings-based approach to evaluate financial market integration. Assuming that home bias is a good proxy of financial market integration, we evaluate the role of the several arguments that have been put forward to explain home bias over time and across funds located in different European countries. We propose a specification model that accounts for the determinants of home bias. We evaluate the impact of the euro introduction, and of the global financial crisis. Our sample includes the holdings of more than 1,000 investment funds, domiciled in 16 different European countries, from 2Q97 to 2Q11. Home (euro) bias is estimated by the difference between actual and ICAPM optimal allocations. Our results are consistent with the evidence presented in chapter 2. Home bias has been decreasing since the euro introduction. Moreover, we find that home bias is lower inside the euro area suggesting different levels of integration in Europe. However, even inside the euro area, the level of integration is not equally shared by all members, with funds based in Portugal, Italy, Greece and Spain showing higher excess exposure to domestic assets. Inside the euro area, the euro

introduction seems to have shifted investors' preferences from domestic assets (home bias) to euro area assets (euro bias). The financial crisis has led to a setback, with an increase on the level of home bias. There is also evidence of a decrease in the financial stocks' holdings, especially in those countries where the phenomenon of home bias is more pronounced, counterbalanced by an increase in investment in health care and energy stocks.

Finally, in chapter 4 we refocus the analysis and examine portfolio holdings from a corporate ownership perspective. We look at domestic and foreign corporate ownership levels and explore to what extent cross-border corporate ownership levels reflect financial market integration. We propose a specification model to evaluate the role of corporate insider theory implications and other control variables to explain the time series and cross-sectional variability of corporate ownership levels given by the holdings of a large sample of European investment funds. Our findings are consistent with the corporate insider theory but there are a few inconsistent results in particular when we rerun our model for different subsamples of funds and holdings. Overall results suggest imperfect integration but are not conclusive.

All in all, the evidence we gathered from our multi-perspective analysis has given us a better understanding of the financial integration process in the euro area. Results support that financial market integration clearly improved after the euro introduction followed by a partial setback just after the outbreak of the last financial crisis. Over the last decade, within the euro area, the home bias phenomenon has been reduced and replaced by euro bias in portfolio allocation. Our results suggest a lower degree of integration in European equity markets outside the euro area. The evidence also supports different levels of integration within the euro area.

The remaining of this thesis is structured in four chapters that include the three above mentioned essays and a concluding chapter that highlights the main research results, points out the major shortcomings and presents some suggestions for future work.

2. A NEW APPROACH TO MEASURE FINANCIAL MARKET INTEGRATION

2.1 Introduction

Considering the state of the art regarding the measurement of financial market integration, in this study, we propose an easier and intuitive way to measure financial market integration. The main contributions of the essay are to propose and empirically evaluate a new approach to measure integration focusing on geographical portfolio style shifts of equity investment funds. The idea of using portfolio holdings and the relative weights of home and foreign assets as an indirect measure of financial integration, was initially suggested by Adam et al. (2002). We follow their suggestion but instead of using portfolio holdings, we estimate the exposure of portfolio NAV returns to several geographic stock market benchmarks. As described by Dor et al. (2002) and Dor et al. (2008), using a Return Style Based Analysis (RBSA) approach should not bias our results due to the equivalence of both approaches (the return based and the holdings-based). Additionally, although the RBSA approach is easier to implement and interpret, there are some constraints: this approach relies on the correct specification of the benchmarks, it is difficult to draw conclusions concerning the future and, lastly, it is slow in detecting style changes (Dor et al., 2002, Maier and Scholz, 2018). In short, the advantage of our approach is the easiest application of the methodology, which is based on a very well accepted model. Furthermore, style analysis allows us to picture time varying integration with easily accessed data.

Given that institutional investors, particularly investment funds, are the main players in today's major capital markets in terms of equity holdings, we focus on equity investment funds. According to the Investment Company Institute (2015) and the International Investment Funds Association (2016), by the end of 2016 there were more than 80 thousand investment funds managing over USD 37 trillion of assets, of which USD 16 trillion were invested in stocks. This importance is also noticed by previous literature such as Faias et al. (2017) or Huang (2015). Despite their importance and their

professional management, mutual fund managers also display behavioral biases and, this way, could be representative of all investors (Pool et al., 2012).

We focus on investment equity funds that invest mostly in the euro area. We also analyze a longer period of time when compared to previous studies. We assess how the process of stock market integration has evolved since the euro currency introduction in 1999 and whether or not integration was affected by the recent financial crisis.

In our study, we use the Lipper data set by Thomson Reuters that includes equity funds invested mostly in the euro area. After excluding offshore, small and highly concentrated funds, our sample consists of 2,880 funds from March 1999 to December 2013. We have adapted the style investment model proposed by Sharpe (1988, 1992) to estimate the geographic allocation of investment fund portfolios.

Our findings indicate an increasing importance of the euro area benchmark factor over time, which is in line with the evidence reported in previous studies. However, the level of importance is clearly time-varying showing a gradual decrease sometime after the introduction of the euro. This decrease accompanies an increase in the relative importance of the stock market factors outside the euro area, particularly regarding to Europe non-euro and to the US/Canada factors[3]. With the advent of the financial crisis[4], we observe that the euro area factor regains a large part of its initial importance when compared to other factors, and is mirrored by the decrease in the exposure to the stock market benchmark outside the euro area, in particular the exposure to the US benchmark factor. This "euro bias" phenomenon is in line with the findings of Balli et al. (2010).

We performed several model variations, mostly to test the effects of currency factors and/or the domicile of the fund. The results are robust except for the subsample of funds domiciled outside the euro area which confirms the prominence and increasing exposure to the euro factor. The decrease in financial integration following the financial crisis is similar to funds based inside and outside the euro area but, thereafter, we find no evidence of a reversion to the pre-crisis level of exposure to the euro area factor. In the

[3] The Europe non-euro factor excludes all the European countries that belong to the euro area.
[4] We establish the advent of the crisis as the Lehman Brothers' bankruptcy in September 2008.

case of non-euro area funds, the evidence suggests that there is a different level of integration inside and outside the euro area.

In order to validate the finding of excessive exposure to home or euro area factors, we construct a different specification for the style investment model. We simply redefine the independent variables/factors used, considering now only three factors: a benchmark for home, for the euro area and for the rest of the world. We find evidence that reinforces the idea that the financial crisis increased the phenomenon of home (euro) bias. Nevertheless, we also find that the impact differs across countries, even inside the euro area, suggesting different levels of financial integration.

The remainder of the chapter is organized as follows: Section 2.2 describes the data and the methodology, Section 2.3 presents our main results and Section 2.4 presents the main conclusions and final remarks.

2.2 Data, Methodology and Variables

2.2.1 Sample Description

We use the Lipper investment fund dataset from Thomson Reuters, the selection obtained included funds that invest in average more than 70% in stocks based in the euro area between March 1999 and December 2013[5]. We collect fund data, on a monthly basis, regarding the actual status[6], the domicile, currency, Net Asset Values (*NAV*) and Total Net Assets (*TNA*). Based on this information, we computed NAV returns in euros (*RNAV*) and in the denomination currency of the fund (*RNAVL*), as well as the number of shares/units of each fund.

We identified a total of 7,274 funds, but many of these funds had missing information, extreme values for *TNA*, unusual number of shares and other potential

[5] The dataset obtained, for which we did not previously make any pre selection, does not provide information related to the countries/regions of investment. We selected a subsample and through the public information available on Morningstar, Inc website we analyzed the allocation strategy of each fund. On average, the funds in the subsample invested 73.6% of the NAV in stocks based in the euro area, reaching 86.9% when considering all the European Stocks. The maximum allocation in stocks based in the euro area was around 99% and the minimum around 50%. The remaining was invested in stocks based outside Europe.

[6] *Status* indicates whether the fund is actually active or has been liquidated or merged into another.

problems. For example, 130 funds had less than 100 shares and 200 funds had a *TNA* below 10,000 euros, with very limited liquidity and, in some instances, owned only by a single investor. In addition, 75% of the funds were domiciled in only four countries.

Following previous studies that used the Lipper dataset, in which those issues had also been identified, we eliminate funds that met the criteria suggested in Ferreira et al. (2012, 2013). We first eliminated funds with ten or less shares and with TNA less than ten thousand euros. Secondly, to identify funds that most probably were not actively managed, we removed those funds with domicile in a country that had less than ten funds registered in the Lipper dataset. Finally, and to avoid bias generated by funds that might have been created for tax management or other legal purposes, we eliminated all funds domiciled in offshores[7]. The final sample includes a total of 2,880 funds.

Table 2.1 presents the summary statistics for the sample funds. 45% are based in France and over 65% are based in four countries. These funds manage assets over 199 billion euros while the average fund manages close to 70 million euros. Across countries, there are wide differences in terms of the number of funds, size and value of assets under management.

Country	**Number**	**%**	**NAV per Share € [Average]**	**TNA M€ [Average]**	**TNA M€ [Sum]**
France	1,288	45	37,313	68	87,019
Germany	209	7	1,803	115	23,945
Spain	186	6	92	43	8,000
USA	180	6	13	103	18,464
Canada	162	6	9	41	6,710
Belgium	160	6	1,090	72	11,455
Austria	119	4	957	29	3,460
Italy	105	4	9	180	18,875
Korea (Republic of)	74	3	1	4	311
UK	54	2	10	83	4,482
Finland	54	2	61	94	5,061
Japan	48	2	64	19	904
Denmark	47	2	73	64	3,012
Chile	46	2	51	4	195

[7] We follow the criteria by IMF Monetary and Exchange Affairs Department (2000) to define offshore countries, eliminating funds, e.g., based in Luxembourg and Cayman Islands.

Country	Number	%	NAV per Share € [Average]	TNA M€ [Average]	TNA M€ [Sum]
Australia	37	1	6	10	358
Sweden	33	1	25	128	4,238
Portugal	20	1	12	34	677
Norway	12	0	92	78	941
Saudi Arabia	12	0	60	39	472
Argentina	12	0	0	1	14
Greece	11	0	10	43	476
Poland	11	0	47	14	157
Total	**2,880**	**100**	**16,932**	**69**	**199,224**

Table 2.1 - Mutual Funds by Domicile Country

Our sample composition is in line with the figures reported by the European Fund and Asset Management Association at the end of 2013. Excluding the funds domiciled in offshores, France is clearly the country with the most funds and, consequently, a higher concentration of Total Net Assets, Germany and Spain follow.

2.2.2 Methodology

Considering that our purpose is to understand financial integration on the basis of investment fund portfolio allocation, we use a model that allows estimating the allocation preferences of fund managers over time, and in particular, a model that analyzes fund exposure to the euro and non-euro area stocks. We use the widely adopted Style Analysis model of Sharpe (1988, 1992), that we have adapted to capture geographic style exposure and exposure shifts.

Sharpe's model (1992) was devised to classify funds *a priori* defined restricted asset classes. The model uses quadratic programming to find the exposures of a fund NAV returns to the returns of a set benchmark asset classes (Sharpe, 1988). The model is indeed a generic factor model:

$$R_{it} = \beta_{i1}F_{1t} + \beta_{i2}F_{2t} + \cdots + \beta_{iN}F_{Nt} + e_{it} \quad (2.1)$$

where (R_{it}) is the periodic investment return, (F_{jt}) is the value of the *j*th factor (*j*=1 to *N*), β_{ij} is the sensitivity of fund *i* to factor *j*, e_{it} is the residual (Atkinson and Choi, 2001). The main objective is to find the best asset allocations β_{ij} to the asset classes restricted to a total exposure of 100% (sum of β_{ij}). This allocation/style (set of asset class exposure) is reached by minimizing the sum of residual squared $(\sum e_{it}^2)$ with all constraints in equation (2.2):

$$\sum e_{it}^2 = [R_{it} - (\beta_{i1}F_{1t} + \beta_{i2}F_{2t} + \cdots + \beta_{iN}F_{Nt})]^2 \quad (2.2)$$

Indeed, this technique is similar to Ordinary Least Squares (OLS) estimation. The objective is identical; to minimize the sum of residual squared. However, in the quadratic programming some constraints are imposed on the exposure coefficients for which OLS could not be so flexible.

2.2.3 Model Specification and Variables Definition

In our base model specification below *RNAV* are the *NAV* returns of the investment funds. The independent variables are four geographic benchmark factors.

$$RNAV_{it} = \beta_{i1}EMU_t + \beta_{i2}EUROPEXEMU_t + \beta_{i3}USCA_t + \beta_{i4}PACIF_t + e_{it} \quad (2.3)$$

As in the original Sharpe model (1992), *RNAV* is given by:

$$RNAV_t = \ln\left({NAV_t}/{NAV_{t-1}}\right) \quad (2.4)$$

NAVs are expressed in euros. Yet, a significant part of funds presented on the database are not domiciled in the euro area[8]. Thus, in order to understand the currency impact, we also calculated the returns in local currencies (*RNAVL*).

While in the original Sharpe model (1992) the independent variables represent different asset classes, in our model the independent variables represent stock market benchmark indices of different geographic regions[9]. The selection of these variables is expected to follow the attributes presented by Sharpe (1992): exclusive; exhaustive and not correlated. Due to the exclusivity attribute, and considering that we intend to analyze the euro area, we select factors that clearly separate assets based in the euro area and those in European countries that do not belong to the euro area. As referred to by Agudo and Gimeno (2005), two assets cannot belong to different factors at the same time.

In our specification model in (2.3) we use four factors. The first factor selected is a benchmark of the euro area (EMU). The second factor is a benchmark of the other European markets that do not belong to the euro area (Europe exEMU).

To evaluate the exposure to markets outside Europe, we consider two geographic factors based on a preliminary analysis of the sample funds domiciled therein. These include the US and Canada (USCA), representing almost 12% of funds in the database, and Japan and Australia (PACIF) with almost 3%.

The benchmark factors are proxies of the correspondent region or country stock market returns and were selected based on the previous literature. We use MSCI indices as in, e.g., Carrieri et al. (2007), Hau (2011) and Boubakri and Guillaumin (2011). For the euro area, we selected MSCI EMU; for other European stock markets excluding equities based in the euro area, we selected MSCI Europe ex-EMU; for the US and Canada, we selected MSCI North America; and, for Japan and Australia, we selected MSCI Pacific.

To assess the robustness of our results, we test some variants of the base model. Since the major impact of a common currency area is the elimination of currency risk, we

[8] Circa 25% of the funds in our sample were not domiciled in the euro area. The US dollar is the second most important currency with 7% of the total funds in the sample.
[9] A first attempt of rearranging the Sharpe model to understand the geographic exposures has already been performed by Rodríguez (2008); however, the purpose was to analyze fund manager performance.

consider an alternative specification with a control variable given by the changes in the effective foreign exchange rate of the euro. This exchange rate is calculated by the European Central Bank (2013), accounting for the relative weight of the euro area commercial partners and the respective bilateral exchange rate. We include the exchange rate of euro as control variable, without imposing any limitation on the estimated procedure as we have done for the other factors, allowing us to extract the effect of the exchange rate that could influence the exposure to non-euro benchmarks in the base model.

$$RNAV_{it} = \beta_{i1}EMU_t + \beta_{i2}EUROPEXEMU_t + \beta_{i3}USCA_t + \beta_{i4}PACIF_t$$

$$+\beta_{i5}FX\_Euro_t + e_{it} \quad (2.5)$$

Table 2.2 defines the variables used in the empirical tests.

Variable	Code	Currency	Definition
Net Asset Value	NAV	EUR	Net Asset Value per share/unit
Total Net Assets	TNA	EUR	Total Net Assets under management
Net Asset Value Local	NAVL	LOCAL	Net Asset Value per share in local currency
NAV Return	RNAV	EUR	Monthly return of the fund in euros
NAVL Return	RNAVL	LOCAL	Monthly return of the fund in local currency
Euro area factor	EMU	EUR	Euro area stock market benchmark
US and Canada factor	USCA	EUR	US and Canada stock market benchmark
Europe non euro area factor	Europe exEMU	EUR	Europe excluding euro area stock market benchmark
Pacific area factor	PACIF	EUR	Pacific stock market benchmark
Effective FX_Euro	FX_Euro	-	Percentage change in Euro effective exchange rate factor

Table 2.2 - Variable Definition

As described in Section 2.2.2, Sharpe's model (1992) uses quadratic optimization as estimation method. Yet, this methodology does not enable to test statistical inference. So, in order to reinforce the robustness of our results, we also use other estimation procedures to determine the exposures of fund NAV returns to the returns of a set benchmark asset classes. Given that the Quadratic Optimization (QO) is equivalent to Ordinary Least Squares (OLS) estimation[10] with constrained parameters, we estimate the parameters in this way.

For that, we impose two constraints. The first is a no leverage constraint, which allows us to closely approximate the return of the fund to a portfolio that reflects similar weights in terms of geographical exposure. The second is a no short sales constraint.

Despite equivalent results, as Sharpe's model (1992) uses quadratic optimization, we decided to present both results.

2.3 Preliminary Results

2.3.1 Summary Statistics

Table 2.3 shows the summary statistics for the NAV returns measured in euros (RNAV) on a cross section perspective, Table 2.4 shows the summary statistics for NAV returns in local currency (RNAVL) and Table 2.5 shows the summary statistics for the NAV returns measured in euros (RNAV) on a times series perspective.

Recovering the discrepancies across countries in terms of the number of funds, size and value of assets under management referred to in Section 2.2.1, Table 2.3, we find that the RNAV also varies widely across countries, but for the countries in the euro area with the highest number of funds domiciled, we find similarities. France, Germany, Spain, and Belgium show an average RNAV of around 0.03%. In contrast, we find the average RNAV for funds domiciled outside Europe, the USA, Canada, Korea, and Japan showing an average negative return. These findings are strengthened when we compose those statistics for funds domiciled inside and outside the euro area.

[10] Our data base is an unbalanced panel with a total number of 255,365 observations.

Domicile Country	Mean	Std. Deviation	Kurtosis	Skewness	N. of Funds
France	0.032%	1.395%	64.582	-5.904	1,288
Germany	0.030%	0.626%	5.568	-0.041	209
Spain	0.048%	0.617%	6.224	-1.452	186
USA	-0.012%	0.706%	-0.042	0.206	180
Canada	-0.072%	0.591%	1.704	-0.412	162
Belgium	0.032%	0.916%	4.113	-1.192	160
Austria	-0.018%	0.729%	13.262	-2.281	119
Italy	0.117%	0.409%	1.950	0.384	105
Korea (Republic of)	-0.765%	2.335%	24.887	-4.413	74
UK	-0.340%	1.905%	16.751	-3.940	54
Finland	0.244%	0.509%	1.050	0.314	54
Japan	-0.043%	0.710%	6.137	1.611	48
Denmark	0.012%	0.809%	6.602	2.107	47
Chile	-0.069%	0.411%	-0.206	0.0392	46
Australia	0.120%	0.699%	2.053	0.038	37
Sweden	-0.069%	0.602%	3.694	-0.0846	33
Portugal	-0.306%	1.356%	17.501	-4.055	20
Norway	0.198%	0.230%	3.546	1.577	12
Saudi Arabia	-0.455%	1.397%	4.919	-2.013	12
Argentina	0.151%	0.895%	3.494	-0.327	12
Greece	-0.259%	0.389%	0.034	-0.925	11
Poland	-0.309%	0.792%	2.522	-1.111	11

Domicile Region	Mean	Std. Deviation	Kurtosis	Skewness	N. of Funds
EMU	0.035%	1.167%	80.410	-6.196	2,152
Non EMU	-0.133%	1.122%	69.522	-6.145	728
Total	**-0.007%**	**1.158%**	**77.265**	**-6.141**	**2,880**

Table 2.3 - RNAV by Domicile Country

Table 2.4 shows the summary for NAV sectioned by currency. For funds denominated in euros the results are essentially very similar because most of these funds are domiciled in the euro area and represent almost 75% of all dataset. For the other currencies, the impact of the exchange rate is noticeable in higher standard deviation and for important currencies like the USD, we find in our dataset that those funds are domiciled in almost all countries considered, it being impossible to compare the results between domicile (Table 2.3) and funds' currency (Table 2.4).

Fund's currency	Mean	Std. Deviation	Kurtosis	Skewness	N. of Funds
Argentina Peso (ARS)	1.008%	1.153%	2.582	1.134	7
Australia Dollar (AUD)	-0.076%	0.655%	1.551	-0.131	37
Canada Dollar (CAD)	-0.158%	0.599%	0.557	-0.439	154
Chile Peso (CLP)	0.330%	0.435%	0.177	0.778	42
Denmark Kone (DKK)	0.023%	0.827%	6.158	2.038	45
Euro (EUR)	0.028%	1.187%	77.182	-6.124	2,158
United Kingdom Pound (GBP)	0.389%	0.738%	1.202	1.309	5
United Kingdom Penny (GBX)	-0.053%	1.567%	30.709	-5.195	41
Japan Yen (JPY)	0.113%	1.130%	9.403	2.544	48
Korea (South) Won (KRW)	-0.511%	2.064%	38.576	-5.633	74
Norway Krone (NOK)	0.193%	0.210%	2.677	1.352	12
Poland Zloty (PLN)	-0.101%	0.761%	1.014	-0.323	9
Sweden Krona (SEK)	-0.073%	0.603%	3.869	-0.819	33
United Sates Dollar (USD)	0.207%	0.840%	7.359	0.632	214

Table 2.4 - RNAVL by Currency

Table 2.5 shows a different perspective of our dataset. In a time series perspective, we also find some discrepancies on the average RNAV between the time windows. As expected in the financial crisis period, we find more fluctuation between two sub consecutive periods, although with limited standard deviation between funds. The impact of the financial crisis in the average RNAV seems to be analogous across all funds. Lastly, the number of funds considered in each sub-period is worth highlighting. The maximum number of funds considered is more than 3 times superior to the minimum, and in average between two consecutive sub-periods the average change is superior to 20%. We could reduce this volatility by excluding the funds that were closed or merged but that could impose a survivorship bias in our results.

Sub-periods	Mean	Std. Deviation	Kurtosis	Skewness	N. of Funds
Mar99-Feb01	-0.13%	3.21%	182.850	-10.934	589
Mar01-Feb03	-2.63%	2.02%	29.319	-0.810	818
Mar03-Feb05	1.15%	4.28%	585.126	-22.085	1,317
Mar05-Feb07	1.20%	1.44%	170.520	2.522	1,617
Mar07-Feb09	-3.30%	2.80%	232.597	-11.775	1,882
Mar09-Feb11	1.91%	1.55%	81.637	-5.596	1,946

Sub-periods	Mean	Std. Deviation	Kurtosis	Skewness	N. of Funds
Mar11-Feb13	-0.21%	1.42%	452.056	-15.238	1,812
Mar13-Dec13	1.35%	0.61%	10.640	-1.621	1,582

Table 2.5 - RNAV by Sub-period

Table 2.6 shows the summary statistics for the benchmark returns measured in euros that proxy the geographical factors in the style analysis model. These are the statistics of the returns over the entire period used to obtain the estimated exposures from March 1999 to December 2013. Average returns vary widely across region and we do not find a direct relation between the benchmarks and the return of the funds domiciled in the corresponding countries. For example, on average, the return of the funds domiciled in the euro area is 0.035% while the benchmark of this area has an average return of -0.008%. This fact could reflect that the funds, even if invested primarily in the euro area, have an investment strategy that is not totally in line with the benchmark of the area reflected; perhaps there is an international investment propensity.

Code	Currency	Mean	Std Deviation	Kurtosis	Skewness
EMU	EUR	-0.008%	5.393%	4.206	-0.772
USCA	EUR	0.171%	4.306%	3.435	-0.569
Europe exEMU	EUR	0.131%	4.097%	3.702	-0.690
PACIF	EUR	0.095%	4.440%	3.392	-0.219
FEX_Euro	EUR	-0.005%	1.369%	4.047	0.524

Table 2.6 - Univariate Analysis

2.3.2 Correlation between Geographic Benchmarks

Table 2.7 demonstrates the correlation between the benchmark geographic factors for the entire period and in eight sub-periods[11]. We observe high and significant correlation coefficients. Over time, correlation coefficients change but always with high levels of significance. In the first sub-periods the levels of correlation increased, reflecting either greater stock market integration or, in some periods, the widely documented effect

[11] Identical sub-periods to the ones considered in the estimation tests.

of increasing co-movement between markets when markets conditions are bad or in extreme market conditions, as was the case from 2007 onwards.

	Entire Period	**Mar99-Feb01**	**Mar01-Feb03**	**Mar03-Feb05**	**Mar05-Feb07**	**Mar07-Feb09**	**Mar09-Feb11**	**Mar11-Feb13**	**Mar13-Dec13**
EMU-USCA	0.738***	0.710***	0.875***	0.760***	0.796***	0.771***	0.555***	0.567***	0.497***
EMU-Europe exEMU	0.871***	0.798***	0.947***	0.896***	0.888***	0.856***	0.821***	0.802***	0.899***
EMU-PACIF	0.619***	0.506***	0.619***	0.203***	0.737***	0.790***	0.465***	0.534***	0.273***
EMU-FEX_Euro	0.029***	-0.196***	-0.423***	0.174***	-0.381***	0.313***	0.300***	0.106***	-0.478***
USCA-Europe exEMU	0.841***	0.882***	0.917***	0.750***	0.753***	0.898***	0.661***	0.779***	0.676***
USCA-PACIF	0.717***	0.733***	0.685***	0.511***	0.581***	0.805***	0.768***	0.689***	-0.000
USCA-FEX_Euro	-0.298***	-0.303***	-0.610***	-0.030***	-0.612***	-0.172***	-0.107***	-0.326***	-0.670***
Europe exEMU-PACIF	0.742***	0.617***	0.702***	0.168***	0.785***	0.862***	0.794***	0.754***	0.332***
Europe exEMU-FEX_Euro	-0.184***	-0.293***	-0.569***	0.047***	-0.42***	-0.05****	0.049***	-0.137***	-0.634***
PACIF-FEX_Euro	-0.270***	-0.321***	-0.549***	-0.226***	-0.436***	0.04***	-0.223***	-0.374***	-0.537***

Table 2.7 - Correlation between Benchmark Factor Returns

Over the last periods, we notice a volatility increase in the correlation level, which could be driven by the turbulent periods after the crisis. Worth highlighting is the descent correlation between the pacific variable and others in the last sub-period.

The high correlation observed is a potential statistical problem to implement the style analysis model, given that the chosen factors are required to be independent (Sharpe, 1992). To overcome this problem, we implement several procedures such as the use of orthogonal factors; the use of standardized variables and the construction of a Ridge Regression. The detail of these procedures and correspondent results are presented in section 2.4.3.

2.4 Model Results and Analysis

2.4.1 Exposure to Euro and Non-Euro Factors

The model is estimated, on an aggregated basis, for sub-periods allowing us to study how the exposures to the different geographic benchmarks have changed over time, and to understand the impact of the euro introduction and the financial crisis. Over the period from March 1999 to December 2013, we consider eight two years' sub periods. These are: March 1999 to February 2001; March 2001 to February 2003; March 2003 to February 2005; March 2005 to February 2007; March 2007 to February 2009; March 2009 to February 2011; March 2011 to February 2013 and March 2013 to December 2013[12].

According to the international version of the CAPM, in a full integration scenario, investors should hold the world market portfolio. This portfolio assumes that investors should hold equities in each foreign country *j* equal to the relative market capitalization of country *j* in the global market capitalization (Solnik, 2000, Schoenmaker and Bosch, 2008). In our model, mutual fund managers allocate their wealth mostly in European assets so we expect, in a full integration scenario, that the exposures to each benchmark are close to the relative weight of each benchmark in the European market capitalization.

The estimated results of the base model (Equation 2.3) indicate a clear and strong importance of the euro area benchmark factor. This is in line with our expectations given that our sample is composed of funds that claim to focus on euro area stocks.

Furthermore, the results show a high level of statistical strength with an increasing R-square, reaching levels around 70% in the two latter sub-periods. In addition, almost all benchmark factors exposures are significant at the 1% level. The estimated exposures to EMU and Europe exEMU are significant at the 1% level in all sub-periods.

The most remarkable feature is the time-varying magnitude of exposure to the euro area benchmark. Over the sub-periods analyzed, we show increasing exposure to benchmarks outside the euro area. This is the case for the factor proxy of the US and Canadian stocks that shows increasing exposures up until the Lehman Brothers' bankruptcy in September 2008.

[12] Due to the fact that the data available ends in December 2013, the last sub-period is smaller with only 10 months considered.

On the other hand, the behavior of the average R-square for the sub-periods could also be informative of structural changes in the behavior of the mutual funds that is not detected through optimization. Despite the fact that the funds claim to invest mainly in the euro area, it appears that they were exposed to other benchmarks in the first sub-periods immediately after the introduction of the euro, a behavior that seems to be reversed later with the financial crisis.

The base model allows us to highlight four important effects, illustrated in Figure 2.1 and shown in Table 2.8. These effects are:

- a strong importance of the euro area's benchmark at the beginning of the sample period;
- a decreasing importance of the euro area's benchmark from March 1999 to February 2005;
- an increase of the exposure to the euro area's benchmark in the latter sub-periods, with a surge just before the financial crisis, and
- a stabilization after the beginning of the financial crisis; yet, the euro area's benchmark importance is still below than the observed in the first sub-period.

Exposures (in %)	**EMU**		**USCA**		**Europe exEMU**		**PACIF**		**Adjusted R^2**	**N. of Funds**
	QO	**OLS**	**QO**	**OLS**	**QO**	**OLS**	**QO**	**OLS**	**OLS**	
Mar99-Feb01	79.3%	79.3%***	0.0%	0.0%	20.7%	20.7%***	0.0%	0.0%	0.89%	589
Mar01-Feb03	44.3%	44.3%***	0.0%	0.0%	55.7%	55.7%***	0.0%	0.0%	7.34%	818
Mar03-Feb05	39.1%	39.1%***	24.5%	24.5%***	35.8%	35.8%***	0.6%	0.6%	7.92%	1317
Mar05-Feb07	68.6%	68.6%***	3.9%	3.9%***	27.4%	27.4%***	0.2%	0.1%	12.40%	1617
Mar07-Feb09	64.7%	64.7%***	0.0%	0.0%	28.1%	28.1%***	7.2%	7.2%***	23.69%	1882
Mar09-Feb11	61.4%	61.4%***	0.0%	0.0%	27.5%	27.5%***	11.1%	11.1%***	31.44%	1946
Mar11-Feb13	60.5%	60.5%***	8.4%	8.4%***	28.7%	28.7%***	2.4%	2.4%***	74.14%	1812
Mar13-Dec13	60.7%	60.7%***	14.2%	14.2%***	25.1%	25.1%***	0.0%	0.0%	69.36%	1582

***significant at 1% level
**significant at 5% level
*significant at 10% level
Quadratic Optimization (QO)
Ordinary Least Squares (OLS)

Table 2.8 - Style Analysis - Based Model

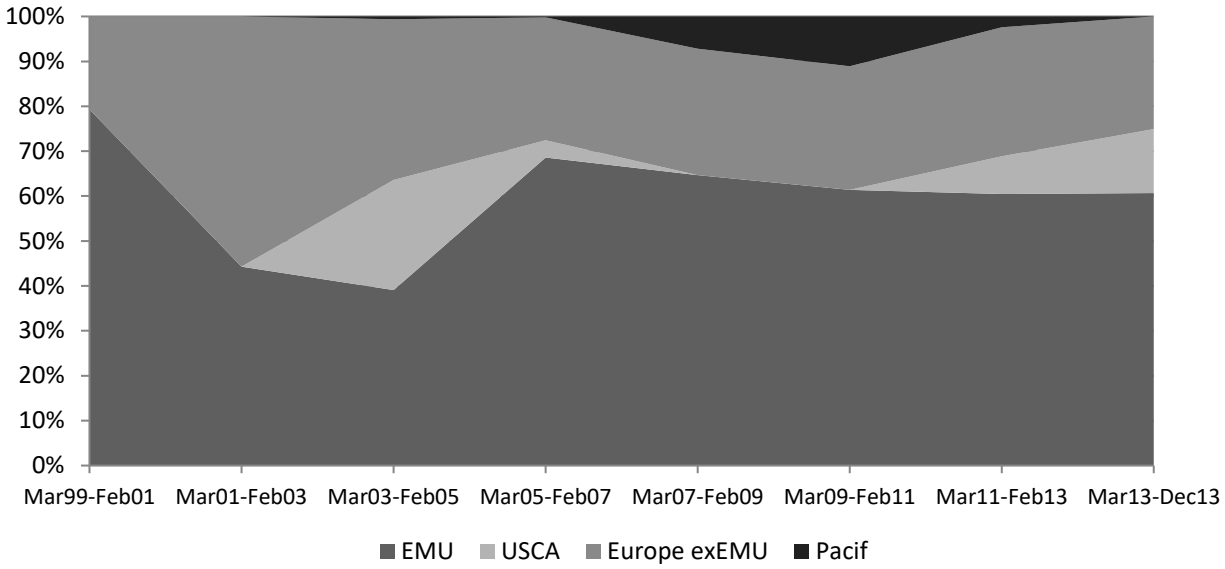


Figure 2.1 - Style Analysis - Based Model

The initial high level of importance of the euro area's benchmark and subsequent decrease is in line with previous literature that refers to a positive impact resulting from the introduction of the euro. Additionally, it is also in line with comments provided by Adam et al. (2002) that pointed to an increase until June 2001 in euro area equities by funds with an international investment strategy. The reverse in the level of integration caused by the recent financial crisis has been documented as well by Pungulescu (2013), Babecky et al. (2013) and Lehkonen (2014). Pungulescu (2013) links the decrease in the financial integration process to the increase of risk and the phenomenon of contagion, both of which have been referred as negative sides of the financial integration. For example, Babecky et al. (2013) state that the financial crisis had a negative effect on all financial segments and across all countries considered in the study[13].

Table 2.9 shows the results using the extended model specification including the foreign exchange variable as control variable (Equation 2.5). The differences to the base

[13] In their study, Babecky et al. (2013) considered the following countries: the Czech Republic, Hungary, Poland, Sweden, the United Kingdom, the United States and the euro area as region.

model are not significant and the main conclusions persist. The foreign exchange variable is statistically significant in almost all periods although the estimated coefficient tends towards zero. The results prove that the exposure to the geographic benchmarks is not affected by the effective foreign exchange rate of the euro.

Exposures (in %)	EMU		USCA		Europe exEMU		PACIF		FEX_Euro		Adjusted R^2	N. of Funds
	QO	OLS	QO	OLS	QO	OLS	QO	OLS	QO	OLS	OLS	
Mar99-Feb01	78.6%	78.6%***	0.0%	0.0%	21.3%	21.3%***	0.0%	0.0%	0.05	0.05***	1.06%	589
Mar01-Feb03	46.6%	46.6%***	0.0%	0.0%	53.3%	53.3%***	0.0%	0.0%	0.05	0.05***	7.51%	818
Mar03-Feb05	37.0%	37.0%***	25.2%	25.2%***	36.8%	36.8%***	1.0%	1.0%	0.01	0.01***	7.93%	1,317
Mar05-Feb07	69.5%	69.5%***	5.6%	5.6%***	23.4%	23.4%***	1.5%	1.5%	0.01	0.01***	12.42%	1,617
Mar07-Feb09	61.3%	61.3%***	0.0%	0.0%	32.5%	32.5%***	5.0%	5.0%***	0.01	0.01***	23.72%	1,882
Mar09-Feb11	63.1%	63.1%***	0.0%	0.0%	26.6%	26.6%***	10.3%	10.3%***	-0.01	-0.01***	31.46%	1,946
Mar11-Feb13	60.4%	60.4%***	8.4%	8.4%***	28.7%	28.7%***	2.4%	2.4%***	0.00	0.00	74.14%	1,812
Mar13-Dec13	60.1%	60.1%***	14.3%	14.3%***	25.6%	25.6%***	0.0%	0.0%	0.02	0.02***	69.70%	1,582

***significant at 1% level
**significant at 5% level
*significant at 10% level
Quadratic Optimization (QO)
Ordinary Least Squares (OLS)

Table 2.9 - Style Analysis with Euro Foreign Exchange Rate Factor

We further investigated if the behavior observed was identical for all the funds. Our aim was to understand how fund managers located in the different counties changed the geographic mix of the portfolios over the sample period. Therefore, to conduct this analysis, we split the database by the domicile of the fund.

We consider two partitions: the first splits the funds between those domiciled in the euro area and those domiciled outside; the second funds based in Europe and funds based outside Europe. We do not find any significant differences between the two partitions criteria, used for the subsets of funds in the geographical portfolio allocation. The results obtained show slight differences between the subset of funds inside and outside the euro area. For this latter subsample, we notice a gradual decrease in exposure to the euro area factor that is not reverted to initial exposures with the onset of the financial crisis. The results are illustrated in Figure 2.2 and shown in Table 2.10. We notice a gradual increase of the weight of the European non-euro area factor, suggesting a preference for stocks that are closer to the domicile of the fund. For example, the exposure to the USCA benchmark increased across the sub periods. For the euro area subsample, the results are very similar to the ones obtained for the base model.

Panel A – Mutual Funds based inside the Euro Area

Exposures (in %)	**EMU**		**USCA**		**Europe exEMU**		**PACIF**		**Adjusted R^2**	**N. of Funds**
	QO	**OLS**	**QO**	**OLS**	**QO**	**OLS**	**QO**	**OLS**	**OLS**	
Mar99-Feb01	70.1%	70.1%***	0.0%	0.0%	29.8%	29.8%***	0.0%	0.0%	0.25%	366
Mar01-Feb03	44.0%	44.0%***	0.0%	0.0%	56.1%	56.1%***	0.0%	0.0%	6.10%	482
Mar03-Feb05	43.7%	43.7%***	22.1%	22.1%***	33.8%	33.8%***	0.4%	0.4%	7.46%	908
Mar05-Feb07	75.4%	75.4%***	2.1%	2.1%	22.5%	22.5%***	0.0%	0.0%	11.4%	1,231
Mar07-Feb09	70.7%	70.7%***	0.0%	0.0%	21.0%	21.0%***	8.3%	8.3%***	19.4%	1,407
Mar09-Feb11	66.8%	66.8%***	0.0%	0.0%	25.2%	25.2%***	8.0%	8.0%***	28.4%	1,462
Mar11-Feb13	67.9%	67.9%***	7.0%	7.0%***	22.2%	22.2%***	2.9%	2.9%***	77.2%	1,390
Mar13-Dec13	69.4%	69.4%***	16.5%	16.5%***	14.1%	14.1%***	0.0%	0.0%	74.4%	1,227

***significant at 1% level
**significant at 5% level
*significant at 10% level
Quadratic Optimization (QO)
Ordinary Least Squares (OLS)

Panel B - Mutual Funds based outside the Euro Area

Exposures (in %)	EMU		USCA		Europe exEMU		PACIF		Adjusted R^2	N. of Funds
	QO	OLS	QO	OLS	QO	OLS	QO	OLS	OLS	
Mar99-Feb01	95.1%	95.1%***	0.0%	0.0%	4.9%	4.9%	0.0%	0.0%	6.43%	223
Mar01-Feb03	44.8%	44.8%***	0.0%	0.0%	55.2%	55.2%***	0.0%	0.0%	9.77%	336
Mar03-Feb05	30.0%	29.6%***	29.7%	30.9%***	39.5%	39.5%***	0.9%	0.0%	8.67%	409
Mar05-Feb07	47.3%	51.8%***	9.4%	0.0%	42.7%	48.2%***	0.7%	0.0%	18.65%	386
Mar07-Feb09	46.8%	46.8%***	0.0%	0.0%	49.2%	49.2%***	4.0%	4.0%***	66.43%	475
Mar09-Feb11	44.1%	44.1%***	2.9%	2.8%**	35.6%	35.6%***	17.5%	17.5%***	57.19%	484
Mar11-Feb13	36.2%	36.1%***	13.3%	13.6%***	49.7%	50.3%***	0.8%	0.0%	67.24%	422
Mar13-Dec13	30.5%	30.5%***	14.5%	14.5%***	55.0%	55.0%***	0.0%	0.0%	56.74%	355

***significant at 1% level
**significant at 5% level
*significant at 10% level
Quadratic Optimization (QO)
Ordinary Least Squares (OLS)

Table 2.10 - Style Analysis for the Mutual Funds based Inside/Outside the Euro Area

Figure A – Mutual Funds based inside the Euro Area

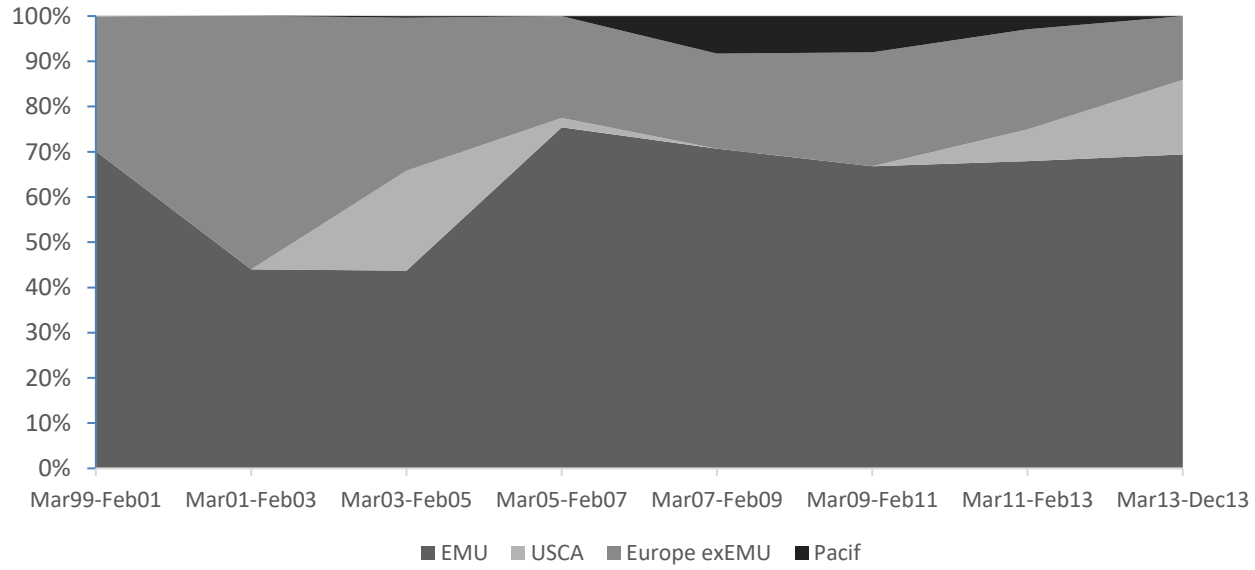


Figure B - Mutual Funds based outside the Euro Area

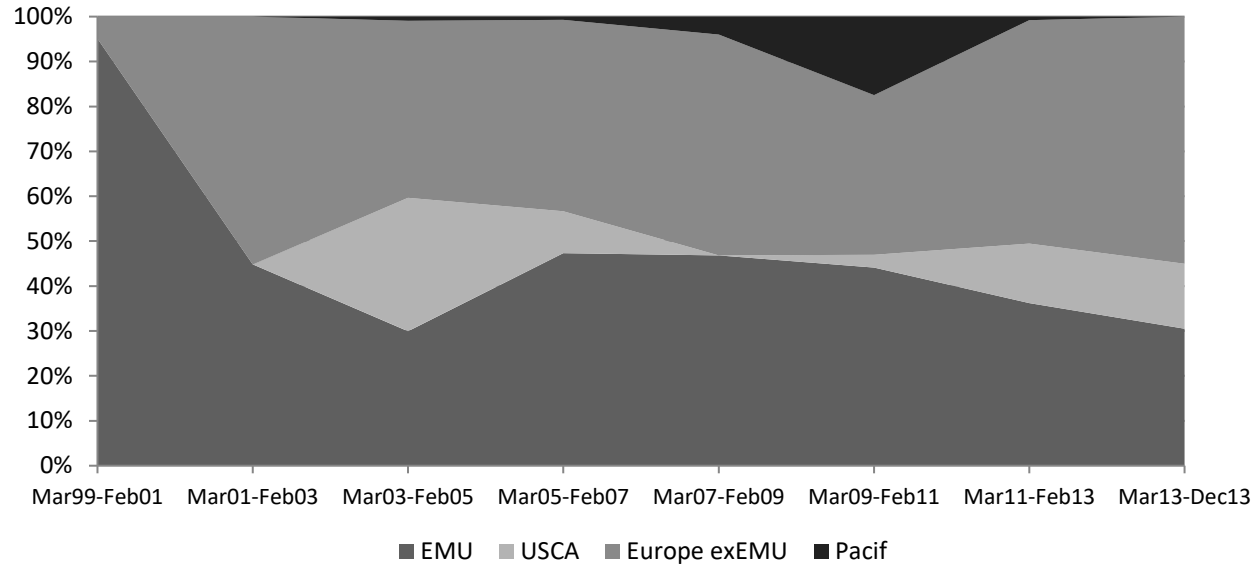


Figure 2.2 - Style Analysis: Funds based Inside/Outside the Euro Area

The analysis of the subsamples was informative because it revealed that the reported U-shaped behavior is not observed for funds domiciled outside the euro area. Furthermore, the importance of the euro area benchmark decreased continuously after February 2007 while there was still time variation in the exposures to other factors outside the euro. These findings suggest that the financial crisis may have impacted the preferences of funds based outside the euro area. The reduction of the exposure to euro area stocks could reflect home bias behavior which is consistent with the euro bias observed for funds domiciled in the euro area.

These results are in line with previous literature that states the crisis period was characterized by increased upheaval with investors concerned more with liquidity and credit risk, and thus leading to a decrease of cross-border activity with growth preference for domestic assets. The investors' nervous behavior along with the geographic discrimination seems to have weakened the integration process (Babecky et al., 2013).

2.4.2 Home bias

To obtain further insight on home bias behavior, we redefine the factors of the style model. We estimate the model considering three geographic benchmark factors: a benchmark factor of the country where the fund is based, a benchmark of the euro area[14] and a benchmark for the world excluding the euro area. We test the bias considering (a) the entire dataset and with three subsets of funds; (b) funds in a country belonging to the euro area; (c) funds in a European country outside the euro area and (d) funds based in a non-European country.

When we split the sample into subsamples of funds domiciled in the euro area and funds domiciled outside the euro area, we are aware that investors' holdings may differ. Taking into account that the dataset is composed of funds that invest primarily in stocks based in the euro area, it is likely that an investor based in the euro area does not have the same portfolio (or identical preferences) as an investor based in the US or in the UK[15]. Furthermore, there may be different levels of integration in countries belonging to the euro area and in countries outside the euro area.

For (a), we used a benchmark of the world excluding the euro area; a benchmark of the euro area excluding the country taken into account (i.e., if it belongs to the euro area otherwise, the benchmark used is the normal euro area benchmark), and the national stock market benchmark. Table 2.11 (Figure 2.3) shows the results of the EMU factor which is the most important factor. Comparing Figure 2.1 and Figure 2.3, we find several similarities: the exposure to the EMU factor is higher in the first sub-period; afterwards we observe a more balanced exposure to all benchmarks.

[14] If the country belongs to the euro area, we use a benchmark of the euro area excluding the country considered. Otherwise we use the benchmark of the entire euro area.
[15] This would be true if all markets were fully integrated.

Exposures (in %)	Home		World exEMU		EMU (exHome)		Adjusted R^2	N. of Funds
	QO	OLS	QO	OLS	QO	OLS	OLS	
Mar99-Feb01	4.0%	4.0%*	0.0%	0.0%	96.0%	96.0%***	0.70%	589
Mar01-Feb03	22.5%	22.5%***	0.0%	0.0%	77.5%	77.5%***	6.34%	818
Mar03-Feb05	15.9%	15.9%***	38.9%	38.9%***	45.2%	45.2%***	7.88%	1,317
Mar05-Feb07	4.0%	4.1%***	22.9%	22.9%***	73.0%	73.0%***	12.12%	1,617
Mar07-Feb09	16.6%	16.6%***	27.0%	27.0%***	56.4%	56.5%***	23.69%	1,882
Mar09-Feb11	17.6%	17.6%***	26.7%	26.7%***	55.7%	55.7%***	31.17%	1,946
Mar11-Feb13	20.2%	20.2%***	29.5%	29.5%***	50.3%	50.3%***	74.60%	1,812
Mar13-Dec13	17.6%	17.6%***	29.0%	29.0%***	53.4%	53.4%***	69.57%	1,582

***significant at 1% level
**significant at 5% level
*significant at 10% level
Quadratic Optimization (QO)
Ordinary Least Squares (OLS)

Table 2.11 - Home Bias Test

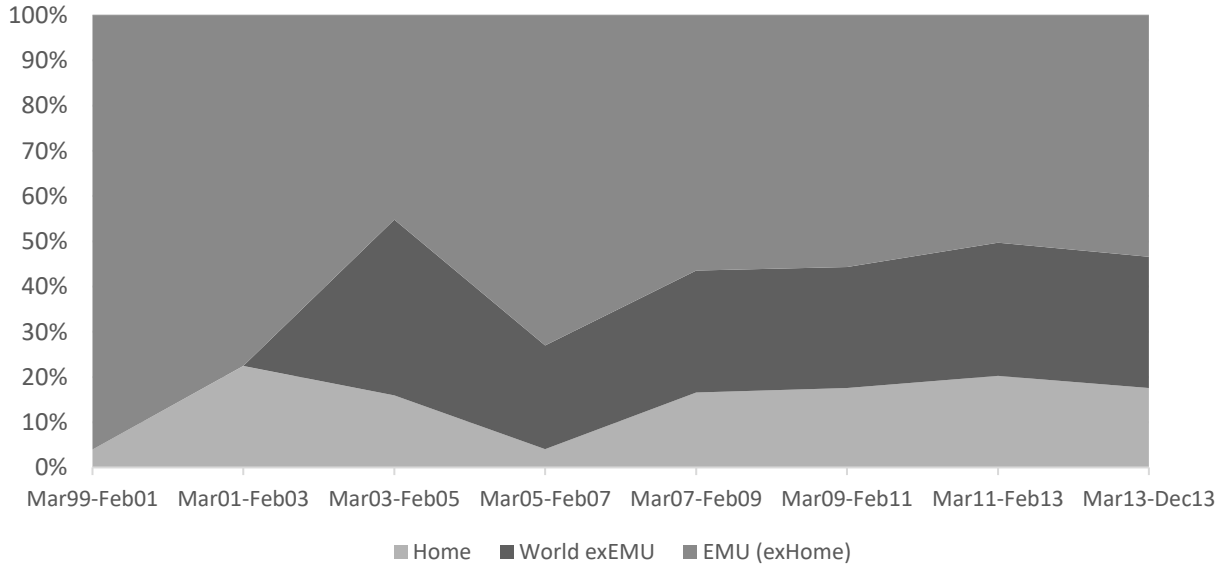


Figure 2.3 - Home Bias Test

The results reveal that the importance of the *Home* factor gradually decreases after the introduction of the euro but increases in the periods just before and during the financial crisis. We also observe that the exposure to the World excluding EMU factor has an inverse behavior to the *Home* factor, consistent with the view that the euro introduction led to an increase in the financial integration that has reversed with the financial crisis.

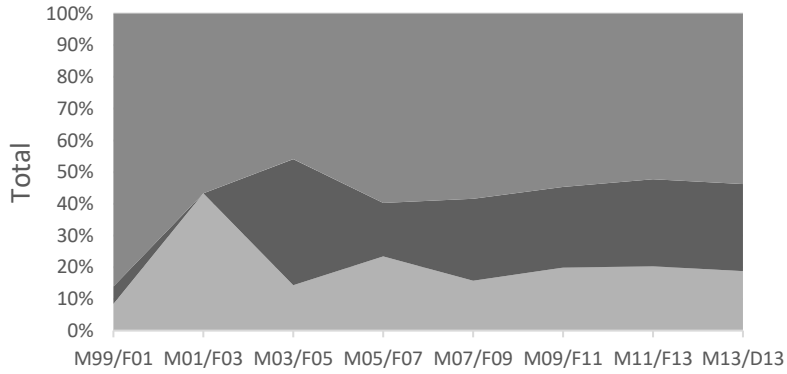
Regarding (b) we also estimate the exposure for the entire subset of funds in the countries that belong to the euro area and in the top three countries in terms of the number of funds domiciled: France, Germany and Spain. The results are shown in Table 2.12 (Figure 2.4). When compared to the entire sample (a) we see that funds domiciled in euro countries have more balanced exposures to all benchmarks, but the EMU benchmark is the greatest. These findings suggest a higher level of integration within the euro area.

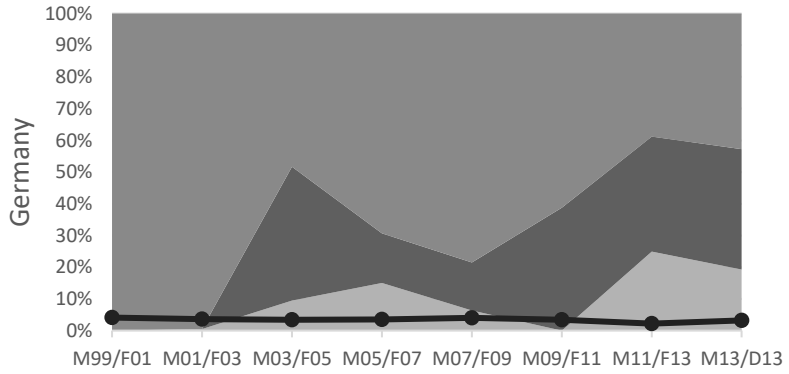
Exposures (in %)	**Euro Area Countries**				
	Home	**EMU exHome**	**World exEMU**	**Adjusted R^2**	**N. of Funds**
Mar99-Feb01	8.4%*	86.1%***	5.5%	0.00%	366
Mar01-Feb03	43.3%***	56.7%***	0.0%	5.64%	482
Mar03-Feb05	14.3%***	45.9%***	39.8%***	7.31%	909
Mar05-Feb07	23.4%***	59.7%***	16.8%***	11.32%	1,231
Mar07-Feb09	15.7%***	58.4%***	25.9%***	19.25%	1,407
Mar09-Feb11	19.8%***	54.6%***	25.5%***	27.98%	1,462
Mar11-Feb13	20.3%***	52.2%***	27.5%***	76.98%	1,390
Mar13-Dec13	18.8%***	53.8%***	27.4%***	73.62%	1,227

Exposures (in %)	Germany					France					Spain				
	Home	EMU exHome	World exEMU	Adjusted R^2	N. of Funds	Home	EMU exHome	World exEMU	Adjusted R^2	N. of Funds	Home	EMU exHome	World exEMU	Adjusted R^2	N. of Funds
Mar99-Feb01	0.0%	100.0%***	0.0%	11.92%	62	90.1%***	0.0%	9.9%	0.00%	156	43.1%***	54.6%***	2.3%	1.78%	35
Mar01-Feb03	0.4%	99.6%***	0.0%	7.31%	77	100.0%***	0.0%	0.0%	6.09%	202	0.0%	91.7%***	8.3%	6.56%	47
Mar03-Feb05	9.5%***	48.3%***	42.2%***	33.03%	105	37.8%***	26.0%***	36.2%***	3.89%	448	21.7%***	56.1%***	22.2%***	75.93%	95
Mar05-Feb07	15.0%***	69.3%***	15.7%***	80.81%	134	43.0%***	45.7%***	11.3%***	6.75%	655	14.4%***	61.8%***	23.8%***	87.80%	132
Mar07-Feb09	6.3%***	78.5%***	15.2%***	74.22%	145	56.6%***	25.1%***	18.3%***	12.35%	801	18.3%***	63.7%***	18.0%***	85.33%	143
Mar09-Feb11	0.0%	61.3%***	38.7%***	74.66%	140	38.9%***	35.1%***	26.0%***	22.75%	898	19.9%***	63.6%***	16.5%***	84.14%	119
Mar11-Feb13	24.9%***	38.8%***	36.3%***	74.58%	133	37.6%***	37.6%***	24.8%***	80.14%	875	13.0%***	70.7%***	16.3%***	84.78%	105
Mar13-Dec13	19.3%***	42.8%***	37.9%***	67.60%	118	48.9%***	27.9%***	23.2%***	79.26%	773	6.1%***	88.0%***	5.9%**	81.32%	86

***significant at 1% level
**significant at 5% level
*significant at 10% level

Table 2.12 - Home Bias Test for Euro Area Countries





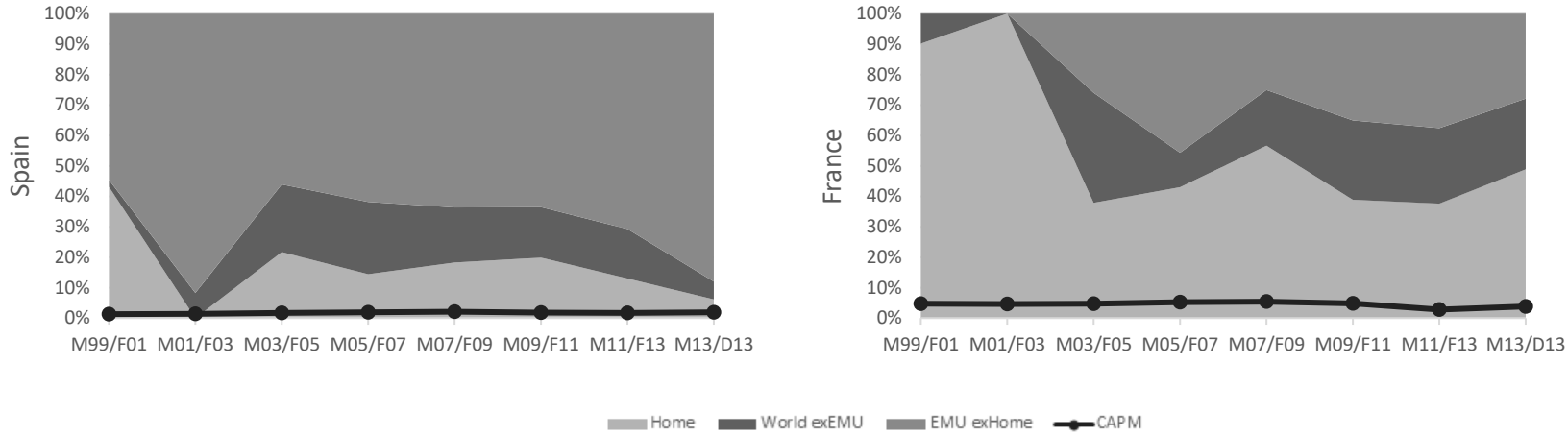


Figure 2.4 - Home Bias: Euro Area Countries

On the other hand, when we look at each of the top three countries, we find different patterns. For Spain and Germany, the results, as expected, show that the major exposure is to the benchmark of euro area excluding the country. Countries have a similar exposure to the other benchmarks. Additionally, as mentioned in section 2.4.1, according to the international version of the CAPM, in a full integration scenario, investors should hold a weight of domestic equities identical to the relative market capitalization of home country in the global market capitalization. So, in Figure 5, we include this CAPM benchmark in order to evaluate the presence of home bias. As shown, Spanish and German investors are overinvesting in domestic assets in almost all sub-periods. The results point to the presence of home bias and also suggest euro bias behavior.

For France, the results are different. The exposure to the home factor is substantial, particularly when compared to the CAPM benchmark level. The highest level of importance of the home factor occurs in the first sub periods and then decreases after February 2003. The increase in the latter sub periods for domestic benchmark is consistent with the idea that the financial crisis increased the phenomenon of home bias.

For (c) we also checked the behavior of the funds domiciled in the UK. The results are shown in Table 2.13 (Figure 2.5). The exposure to the Home factor is significant and higher when compared to Spain and Germany, suggesting a stronger home bias due to a higher deviation from the benchmark given by CAPM. The evolution of the euro area factor, with the highest level in the first sub period and then a decrease in the later sub periods, suggests that funds domiciled outside the euro area shift their preference for assets based outside the euro area.

Exposures (in %)	**UK**		**World exEMU**		**EMU**		**Adjusted R^2**	**N. of Funds**
	QO	**OLS**	**QO**	**OLS**	**QO**	**OLS**	**OLS**	
Mar99-Feb01	0.0%	0.0%	0.4%	0.4%	99.6%	99.6%***	2.74%	13
Mar01-Feb03	60.8%	60.7%***	0.0%	0.0%	39.2%	39.3%***	8.64%	23
Mar03-Feb05	26.6%	26.6%***	73.4%	73.4%***	0.0%	0.0%	14.47%	30
Mar05-Feb07	25.5%	25.5%***	0.0%	0.0%	74.5%	74.5%***	78.03%	34
Mar07-Feb09	35.4%	35.4%***	0.0%	0.0%	64.6%	64.6%***	66.39%	39
Mar09-Feb11	42.2%	42.2%***	0.0%	0.0%	57.8%	57.8%***	20.80%	41

Exposures (in %)	UK		World exEMU		EMU		Adjusted R^2	N. of Funds
	QO	OLS	QO	OLS	QO	OLS	OLS	
Mar11-Feb13	26.8%	26.8%***	20.1%	20.1%***	53.1%	53.1%***	74.20%	30
Mar13-Dec13	24.0%	24.0%***	39.8%	39.8%***	36.2%	36.2%***	71.99%	19

***significant at 1% level
**significant at 5% level
*significant at 10% level
Quadratic Optimization (QO)
Ordinary Least Squares (OLS)

Table 2.13 - Home Bias Test for Mutual Funds based in the UK

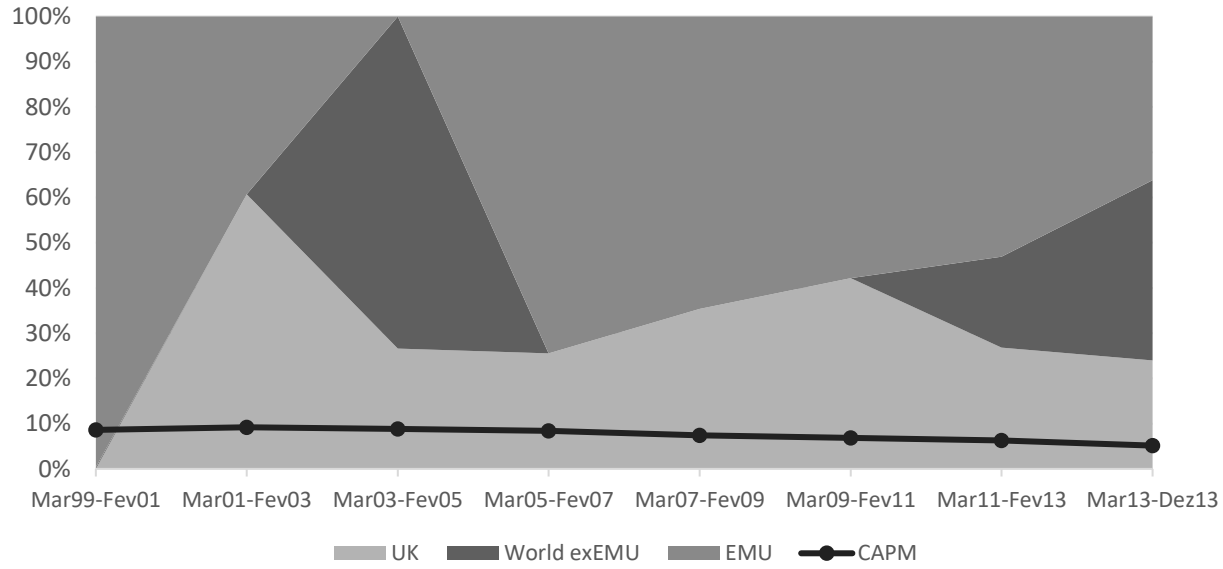


Figure 2.5 - Home Bias: Funds based in the UK

Finally, for the funds domiciled in the US[16] (d), our guess was that the exposure to the Home factor would be null given that they are investing mostly in the euro area. Nevertheless, after the introduction of the euro currency, the EMU factor shows a decrease in importance as indicated in Table 2.14 (Figure 2.6). Comparing Figure 2.1 and Figure 2.6, we observe that the behavior of the euro area factor is the symmetric to the World exEMU factor, suggesting a positive impact of the euro introduction on worldwide

[16] We test for the entire subset with countries that do not belong to euro area. The results (not reported, but available upon request) show a lower importance of the home factor balanced with a higher importance of the world factor. The results suggest more balanced exposures to all benchmarks after the introduction of the euro and in the later sub periods after the first impact of the financial crisis.

financial integration. The two latter sub-periods reinforced the perspective of more balanced exposures after the negative effects of the financial crisis, with the US factor gaining significant importance while the euro area factor stabilized in a level of importance clearly below the initial levels, in 1999. Overall, we observe more balanced exposures to all benchmarks (local and foreign) after the euro introduction and excluding the shock of the financial crisis, indicating that the importance of location has been decreasing over the last 15 years.

Exposures (in %)	**US**		**World exEMU**		**EMU**		**Adjusted R^2**	**N. of Funds**
	QO	**OLS**	**QO**	**OLS**	**QO**	**OLS**	**OLS**	
Mar99-Feb01	0.0%	0.0%	0.0%	0.0%	100.0%	100.0%***	9.00%	73
Mar01-Feb03	0.0%	0.0%	1.9%	1.9%	98.1%	98.1%***	9.06%	108
Mar03-Feb05	0.0%	0.0%	40.6%	40.6%***	59.4%	59.4%***	72.98%	117
Mar05-Feb07	0.0%	0.0%	44.5%	44.5%***	55.5%	55.5%***	49.78%	80
Mar07-Feb09	0.0%	0.0%	72.0%	72.0%***	28.0%	28.0%***	55.37%	80
Mar09-Feb11	0.0%	0.0%	52.3%	52.3%***	47.7%	47.7%***	71.16%	84
Mar11-Feb13	0.0%	0.0%	52.6%	52.6%***	47.4%	47.4%***	77.29%	87
Mar13-Dec13	14.8%	14.8%***	38.6%	38.6%***	46.6%	46.6%***	73.76%	84

***significant at 1% level
**significant at 5% level
*significant at 10% level
Quadratic Optimization (QO)
Ordinary Least Squares (OLS)

Table 2.14 - Home Bias Test for Mutual Funds based in the US

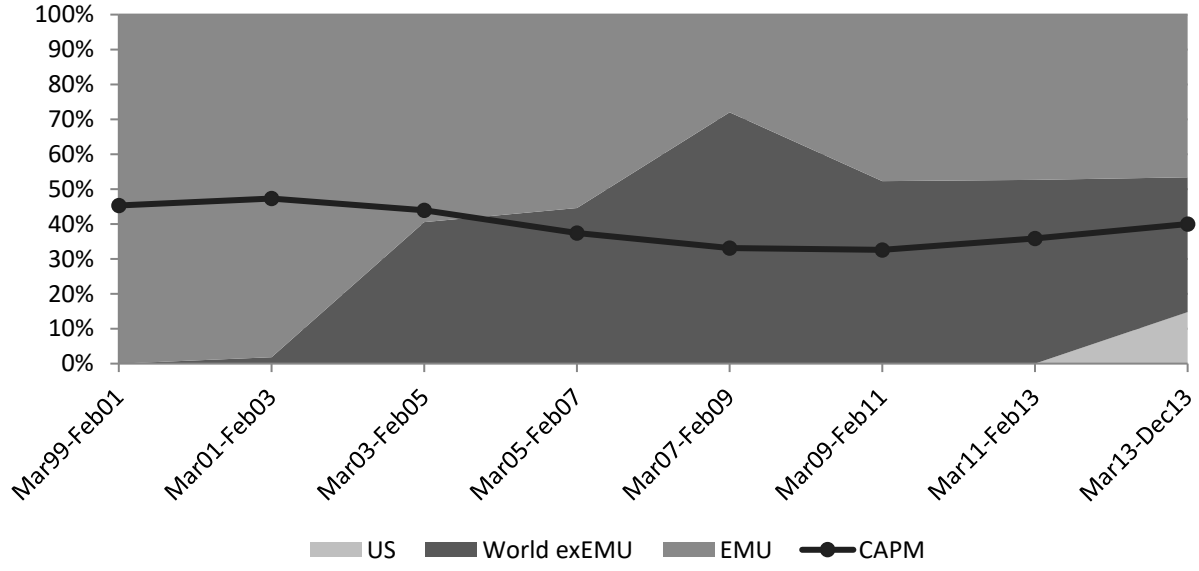


Figure 2.6 - Home Bias: Funds based in the United States

2.4.3 Robustness Tests

In order to access the robustness of our results, we perform some additional analyses described below.

As mentioned in section 2.3.2, the high level of correlation between factors, with some coefficients above 0.75, could be a problem, given that multicollinearity is in itself a violation of one requirement to implement the style-based Sharpe model (1992).

In order to test for multicollinearity, we calculate the variance inflation factor (VIF) for each factor. Figure 2.7 pictures the VIF. VIF are below 10 (10 is usually considered as the level of which we can conclude for multicollinearity). Nevertheless, and as we find that EMU and Europe exEMU factors show a VIF superior to 4, we perform some additional tests in order to check if our results are influenced by that.

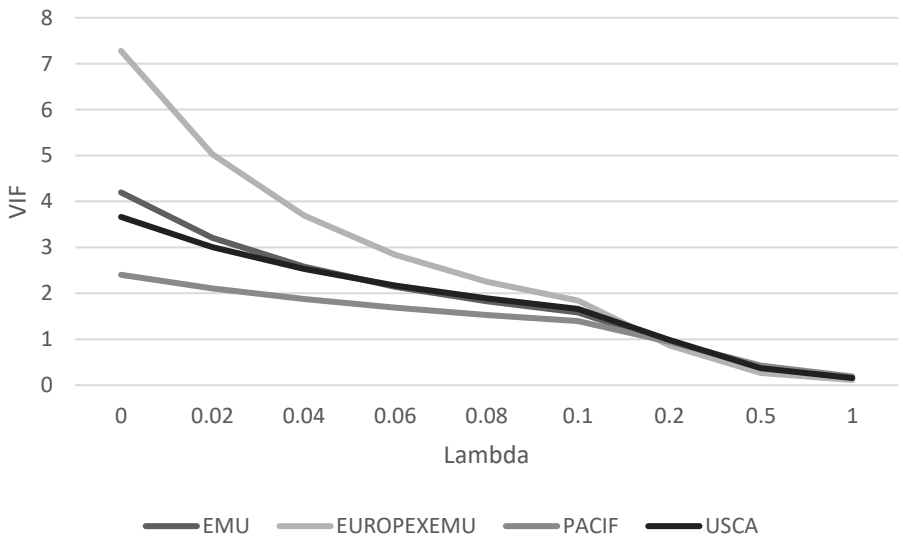


Figure 2.7 - Variance Inflation Factor

We start by using the residual series (orthogonal variables), that result from regression the critical variables against each other, as an alternative to the raw independent variables, but we still observe similar VIF (not included here for space constraints but available upon request). We then used standardized variables, but once again we reach the same results: high level of correlation and similar VIF results (available upon request). Lastly, we use a Ridge Regression, technique that allows

analyzing regressions which suffer from multicollinearity. As shown in Figure 2.7, by imposing a lambda of 0.04, we reduce all the VIF above 4 (in all the periods). Table 2.15[17] shows that, while changing slightly the regression estimates, the results are robust and so the high level of correlation does not seem to affect our main conclusions.

Exposures (in %)	EMU		USCA		Europe exEMU		PACIF		Adjusted R^2	N. of Funds
	OLS	Ridge	OLS	Ridge	OLS	Ridge	OLS	Ridge	OLS	
Mar99-Feb01	74.8%***	66.8%	8.3%	4.9%	-24.5%**	-13.4%	-11.8%***	-10.1%	1.92%	589
Mar01-Feb03	64.5%***	66.9%	-58.9%***	-30.3%	135.9%***	83.6%	-81.9%***	-79.3%	12.09%	818
Mar03-Feb05	36.2%***	34.1%	26.6%***	27.5%	40.2%***	40.5%	7.6%	7.3%	7.93%	1317
Mar05-Feb07	70.9%***	59.8%	2.6%	7.0%	22.1%***	26.7%	7.7%	2.9%	12.42%	1617
Mar07-Feb09	65.6%***	59.1%	-4.1%*	0.6%	30.1%***	28.2%	5.1%***	8.8%	23.72%	1882
Mar09-Feb11	62.4%***	55.8%	5.2%***	-1.3%	25.0%***	33.1%	10.6%***	5.1%	31.59%	1946
Mar11-Feb13	60.4%***	56.7%	7.3%***	7.5%	28.9%***	30.7%	2.1%***	3.3%	74.15%	1812
Mar13-Dec13	66.3%***	55.5%	7.3%***	3.6%	17.5%***	31.7%	-9.0%	-9.3%	70.67%	1582

***significant at 1% level
**significant at 5% level
*significant at 10% level

Table 2.15 - Ridge Regression

To enable inference of statistical significance not allowed by quadratic optimization, as mentioned in Section 2.2.3, we simultaneously apply and compare two techniques: quadratic optimization (QO) and Ordinary Least Squares (OLS) estimation[18]. The results of the application of the OLS estimation with period weights provides support for the model statistical strength. In the base model, the average adjusted R-square increases over time, reaching levels of around 70% in the two latter sub-periods. In

[17] Considering that Eviews does not allow constraints on the estimated coefficients, when applied the Ridge Regression technique, Table 2.15 compares the results between the application of Ridge Regression technique and the application of the OLS (without any restriction).

[18] We also test the application of the estimation through OLS without any restriction or robustness least squares (RLS) (results not reported, but available upon request). The results are satisfactory as, in almost all sub-periods, the restrictions were respected (even though not having been imposed). When in the first model some exposures are negative, in the second they are simple zero and without any statistical significance. In Eviews, the advantage of the utilization of the OLS without restrictions is the possibility of using period weights. That possibility is relevant as the average R square across all sub-periods is above 62% (in the restricted method the R square average is slightly above 30%). Despite all the different estimation methods, the main conclusions subsisted which in itself is evidence of robustness.

addition, most variables are significant at the 1% level. The variables EMU and Europe exEMU are significant at 1% level in all sub-periods.

Finally, considering that, funds based in France represent almost half of the sample, we rerun the regression excluding all funds based in France. The results, available upon request, are similar.

2.5 Summary and Main Conclusions

This chapter proposes a new approach to analyze and measure financial integration. We apply the style analysis model from Sharpe (1992) to address the level and changes over time in financial integration. Overall, our new methodology, based on an adaptation of a model used for different purposes, proves to be robust, while being easier to apply and not demanding in terms of data requirements and computational procedures. Furthermore, we analyze a longer period which considers a very significant time for the euro area, that is, the introduction of the single currency and the efforts for more integration following the financial crisis.

Using the Lipper's dataset, we adapt the style analysis model to evaluate how managers change their portfolio geographical allocation following the introduction of the euro and after the beginning of the financial crisis.

Our findings confirm previous evidence that documented an intensification of the financial integration following the euro introduction. The results show that immediately after the euro introduction, the returns of funds are mainly driven by the EMU benchmark. After that initial period we show an increasing more balanced exposure to other benchmarks outside Europe. Nevertheless, we also show a reversion in the level of financial integration starting just before the financial crisis and that with the intensification of the financial crisis funds became more exposed to the euro area. This behavior is observed particularly for funds based in the euro area. These results reinforce the recent literature that describes the intensification of home/euro bias behavior as one of the consequences of the financial crisis, a different behavior for funds domiciled in different locations suggests partial financial segmentation, even inside the euro area.

3. EUROPEAN INVESTMENT FUNDS EQUITY HOLDINGS AND FINANCIAL MARKET INTEGRATION

3.1 Introduction

As mentioned in chapter 1, the literature is rather consensual about the benefits of international diversification. According to the International Capital Asset Pricing Model (ICAPM) investors could fully eliminate idiosyncratic risk by holding a fully internationally diversified portfolio (Solnik, 1974). As such, world market diversification entails lower risk when compared to what would be achieved by investing solely in domestic markets (Schoenmaker and Bosch, 2008). In previous empirical tests, considering European investors, the gains of international diversification, are estimated between 2 and 3 percent per year[19], considering the same level of risk (Schoenmaker and Bosch, 2008).

In spite of the evidence of the advantages of international diversification, French and Poterba (1991) and several studies thereafter (Baele et al., 2007, Schoenmaker and Bosch, 2008, Chan et al., 2009, Levy and Levy, 2014) report high levels of preference for domestic assets, a phenomenon that has been since then denominated as home bias. More recent studies mention that home bias has gradually changed, for a preference not only to home but also to the nearness, leading to a local or regional bias, driven by less stringent capital controls and the resulting intensification of capital flows (Aabo et al., 2013, Baltzer et al., 2013, Bernile et al., 2015, Baltzer et al., 2015).

This seems to be the pattern of equity holdings in the euro area. Previous literature has shown that the introduction of the euro led to an increase in financial integration along with a decline of the home bias. This is shown, for example, by Pungulescu (2015) that measures home bias as a proxy for level of financial integration.

[19] The gains from international diversification are measured as extra return that investors could obtain if they change the current portfolio allocation to the optimal portfolio stated by ICAPM.

Balli et al. (2010) report a decline in the home bias together with an increasing preference for local assets in Europe: the euro bias. Euro area investors show an excess exposure to assets of companies within the euro region, when compared to the optimal exposure implied by the ICAPM (Balli et al., 2010). ICAPM states that in a full integration scenario, benchmark weights are given by the proportion each country has in the global equity market portfolio (Baele et al., 2007, Vermeulen, 2013).

Many studies came across with several explanations for the home bias puzzle. Arguments can be divided in three categories: structural, informative and behavioral. Currency risk, diversification capacity, common trading platforms and transaction costs are among some of the most relevant structural drivers. Information asymmetry and excess of confidence are, respectively, an example of informative and behavioral drivers[20].

Given the evidence of home bias and the inability of the ICAPM framework to explain investors' holding choices, other theoretical arguments emerged, such as the Corporate Insider Theory (Stulz, 2005, Kho et al., 2009). This approach points out differential arguments to account for home bias, arguing that, domestic investors allocate a more significant part of their wealth in one company in order to have corporate control. Since not all shares freely float, resulting in that institutional and particularly foreign institutional investors most likely will not be able to own the portions that would be dictated by ICAPM and consequently increase holdings in their domestic markets. Expropriation risk and the inability of the legal system to protect the minority shareholders' interests could also be considered as drivers of the "home bias" since these features usually deter more severely foreign investors.

Supported in the arguments for the home bias phenomenon, our study analyzes the impact of the euro introduction and the recent financial crisis on the allocation strategy of European investors. We look at those arguments to assess the drivers of home and euro bias and to measure the changes in the allocation strategy of European investment funds in the period between the pre introduction of the euro and just after the recent financial crisis. While there is evidence supporting the existence of euro bias in portfolio holdings

[20] See, for example, Baele et al., 2007, Lutje and Menkhoff, 2007, Chan et al., 2009, Aabo et al., 2013, Thapa et al., 2013, Levy and Levy, 2014, Baltzer et al., 2015, Mishra, 2015.

of European investors and increasing financial integration in the euro area, the impact of the euro introduction and the recent financial crisis in the allocation strategy of the European investors has not yet been established.

In chapter 2, we use a return-style analysis to assess the level of equity market integration in the euro area using investments return fund data. In this chapter we analyze portfolio holdings as in Dor et al. (2002) to assess the robustness of those findings and the implications for financial market integration.

Following some related studies, such as Baele et al. (2007), De Santis and Gérard (2009), Chan et al. (2009), Vermeulen (2013), Thapa et al. (2013) and Mishra (2015), we use the weights provided by ICAPM as the benchmark to measure the bias in the portfolio weights.

Our analysis focuses on institutional investors' holdings[21].

Despite the proclaimed professional management, investment funds managers may also suffer from behavioral bias such as the excess of confidence or over preference for companies based in the country where they live or were born[22].

We use a dataset by Thomson Reuters that has information on the holdings of investment funds based in Europe that potentially invest in assets all over the world. Our sample consists of 1,063 funds domiciled in 16 different European countries and covers the period from 2Q97 to 2Q11[23].

We adapt the specification model proposed by Thapa et al. (2013) using the measures of the home and euro bias as the dependent variable. The explanatory variables are proxies of the arguments that have been put forward to explain the phenomenon of home bias (that we reviewed thoroughly in section 1.2, Chapter 1). We also include dummies to control for time and location effects.

[21] According to Investment Company Institute (2015) and The International Investment Funds Association (2016), by the end of 2015, there were almost 80 000 investment funds managing over USD. 37 trillion of assets, of which USD 16 trillion were invested in stocks.
[22] See for example Lutje and Menkhoff (2007) and Pool et al. (2012).
[23] Our dataset was obtained by merging of two separate data sets. For the period between 2Q97 and 3Q07 we do not have information regarding the industry of each holding. As such, we evaluate the industry allocation impact of the period pre and post financial crisis.

Our findings suggest that funds based inside the euro area have lower home bias. These lower levels of home bias are specially observed after the euro introduction and along with an increased preference for euro area assets. Our findings are consistent with increasing financial market integration inside the euro area boosted by the euro introduction.

Yet, our results also show that the financial integration process inside the euro area is not the same for all member countries. We show that funds based in Portugal, Italy, Greece and Spain, hold more domestic assets which could reflect lower levels of integration in these countries.

Our study also indicates that the financial crisis has led to a setback on the level of home bias, suggesting that home bias increases in periods of financial turmoil. We also document a decrease in the holdings in the financial industry well beyond the contraction in market capitalization of the industry. This decrease was counterbalanced by an increase in holdings in health care and energy industries. We also document that funds based outside the euro area hold more stocks of companies in non-tradable industries. Along with a higher level of home bias, this could suggest a lower level of integration in European countries outside the euro area given that exposure to these industries is a poor hedge for domestic shocks.

Overall, our findings show that, along with the overall impact of the euro introduction reducing home bias and the setback caused by the financial crisis, there are still different levels of integration across euro area countries.

The rest of this chapter is organized as follows. Section 2 describes the data and the empirical methodology. Section 3 presents the empirical results and Section 4 summarizes and concludes.

3.2 Data, Methodology and Variables

3.2.1 Data and Sample

We collect portfolio holdings from a Thomson Reuters dataset that comprises 1,063 investment funds based in sixteen different European countries[24]. Investment funds in our sample have no restrictions in their geographic investment policies. These funds are equity funds and thus invest mainly in stocks but may also invest in other financial assets like bonds or derivatives and cash.

The dataset contains information regarding the equity holdings of the funds.

Equity holdings are available on a quarterly basis, for the period between June 1997 and June 2011. The dataset includes also information about the investment style, level of turnover and domicile of the fund. For all the stocks that compose the portfolio, we collect information on headquarters of the company, industry[25], shares outstanding, share prices and number of shares held. Based on that information, we calculate the equity portfolio value, the percentage invested in stocks domiciled in the same country as the fund (holdings in home stocks), the percentage invested in stocks based in the euro area (holdings in euro area stocks) and in other different non-euro regions (non-euro Europe, America, Asia and Africa. We classify holdings in eleven industry categories: Health Care; Financials; Industrials; Consumer Staples; Energy; Diversified; Technology; Telecommunication; Services; Materials; Consumer Discretionary and Utilities.

Additionally, we separated industries into two major groups: tradable and non-tradable industries, based on the guidelines of Zeugner (2013).

Table 3.1 presents the summary statistics for the funds in our sample. Over fifty percent of the funds are based in only three countries (France, Germany and the UK). This high level of concentration is in line with the figures reported by the European Fund and Asset Management Association for the end of 2013. More than one third of the funds are based in the United Kingdom (UK). France and Germany come next with, respectively, 61 and 125 funds. Countries with more funds show aggregated higher value of assets

[24] 56% of funds are based inside the euro area and 44% are based in European countries that do not belong to the euro area, mainly, England.
[25] These are only available for the period between 4Q07 and 2Q11.

under management (NAV). In line with the figures reported by the European Fund and Asset Management Association, France is the country where investment funds have the highest value of assets under management. We also find that funds based outside the euro area are, on average, greater in terms of NAV when compared to those within the euro area.

Country /Region	Number	%	NAV M€ [Average]	%Home [Average]	%Euro Area [Average]	%Europe [Average]	%Asia [Average]	%America [Average]	%Africa [Average]
Austria	55	5%	133	14%	42%	24%	17%	16%	0%
Belgium	33	3%	413	11%	54%	22%	4%	20%	0%
Denmark	45	4%	376	17%	24%	36%	22%	18%	0%
Finland	43	4%	216	42%	62%	16%	14%	9%	0%
France	61	6%	1,254	45%	65%	18%	5%	11%	0%
Germany	125	12%	1,149	31%	55%	17%	13%	15%	0%
Greece	41	4%	102	84%	90%	3%	2%	5%	0%
Ireland	36	3%	749	3%	34%	21%	26%	19%	0%
Italy	25	2%	462	38%	64%	17%	10%	10%	0%
Luxembourg	29	3%	264	5%	41%	19%	16%	23%	1%
Netherlands	47	4%	1,011	18%	46%	17%	13%	23%	0%
Portugal	51	5%	84	34%	69%	8%	7%	16%	0%
Spain	46	4%	218	52%	81%	11%	1%	7%	0%
Sweden	64	6%	1,096	47%	16%	62%	10%	12%	0%
Switzerland	6	1%	836	7%	31%	46%	15%	6%	2%
UK	356	34%	1,387	43%	22%	49%	15%	13%	1%
Euro Area	592	56%	625	32%	58%	16%	11%	14%	0%
Non Euro Area (Europe)	471	44%	1,256	41%	22%	50%	15%	13%	1%
Total	**1,063**	**100%**	**927**	**36%**	**41%**	**32%**	**13%**	**14%**	**0%**

Table 3.1 - Mutual Funds by Domicile Country and Region

We find that, on average, funds based in the euro area invest more (less) in euro area (domestic or home) assets, when compared to non-euro area funds. There are similarities respecting the international allocation, i.e., the percentage allocated in assets based outside Europe is quite similar for the two groups. At the country level, we find

more differences across countries, indicating that the country where the fund is based impacts portfolio allocation decisions.

3.2.2 Methodology

As we aim to analyze the changes in the allocation strategy since the euro introduction, we perform a thorough analysis of the European holdings. We evaluate the role of a set of drivers to explain home bias and euro bias. We follow the methodology proposed by Thapa et al. (2013), but we propose a slightly different specification that allows us to identify the bias in European mutual funds holdings.

Home bias and euro bias are defined taking into account the study of Thapa et al. (2013) but also the work from Baele et al. (2007), Chan et al. (2009), Baltzer et al. (2013) and Vermeulen (2013). The holdings benchmark references are given by the predictions of the ICAPM[26]. Investors should hold equities in each foreign country *j* equal to the relative market capitalization of country *j* on world market capitalization. Thus, the optimal weight of assets based in country *j* (w_j) is given by:

$$w_j = \frac{MV_j}{\sum MV} \quad (3.1)$$

where MV_j is the market capitalization of country j and $\sum MV$ is the world market capitalization (obtained as the sum of the all the individual countries' market capitalizations).

In order to get the reference portfolio weights, we use the world index calculated by Thomson Reuters' Datastream based on the regional market capitalizations. Datastream provides information about the portfolio weight for each individual stock in the index and the corresponding industry within a country. The benchmarks weights are calculated for the sixteen European countries included in the Thomson Reuters dataset. The industry benchmarks are computed accordingly.

[26] ICAPM assumes full market integration. While we find this assumption does not hold in reality, we use nevertheless the world market portfolio as the reference portfolio.

We compute the actual and benchmark reference weights. Following previous studies, such as Baele et al. (2007), Pungulescu (2015) and Mishra (2015), we then compute, for each country, the home (HB) and the euro bias (EB) given by the difference between actual (ACT) and benchmark ($BENCH$) foreign holdings weights as follows:

$$H(E)B = 1 - \frac{ACT}{BENCH} \qquad (3.2)$$

Foreign is defined as non-domestic assets for HB and non-euro assets for EB.

In most cases, the H(E)B measure ranges between 0 (no home bias), when the actual weight is equal to the optimal dictated by the ICAPM reference, and 1 when the portfolio has no foreign holdings (only domestic stocks, i.e., the most extreme home bias). When ACT allocation is superior to the BENCH a negative value is obtained, meaning an overinvestment abroad.

When the fund is based in a country within the euro area, the EB measure also includes the holdings allocated to the domestic stocks, capturing the effect of home bias. We also computed the EB measure excluding the domestic stocks holdings. Tables 3.3-3.6, report the differences between actual and reference holdings (ACT - $BENCH$), allowing a more intuitive understanding of the home bias and the euro bias.

3.2.3 Model Specification and Variables Definition

To identify the main drivers of the home bias and the euro bias, we use a model that allows us to test not only what impacts more on the allocation deviations, but also to understand if the bias was specially impacted by the euro introduction and/or by the financial crisis. We also control for the mutual fund location.

In the model of Thapa et al. (2013) the dependent variable is the actual portfolio weight of home assets (ACT_i) and the benchmark portfolio weight is included as an

independent variable. Given that we want to explain the home (euro) bias, our dependent variable is the H(E)B measure[27]. Our specification model is given by:

$$\begin{aligned} HB_{it}\ or\ EB_{it} = {} & \beta_0 + \beta_1 VFOREX_{it} + \beta_2 RESTRIC_{it} + \beta_3 OPEN_{it} + \beta_4 GDP_{it} \\ & + \beta_5 MKTCAP_{it} + \beta_6 RLOCAL_{it} + \beta_7 VOL_{it} + \beta_8 DIVPOT_{it} \\ & + \beta_9 DEURO_t + \beta_{10} DCRISIS_t + \beta_{11} DEA_i + \beta_{12} DPIGS_i \\ & + \beta_{13} EURONEXT_i + \beta_{14} VFOREX * DEURO_{it} \\ & + \beta_{15} VFOREX * DEA_{it} + e_{it} \end{aligned} \tag{3.3}$$

We consider two dummy variables to evaluate, respectively, the impact of the euro introduction and a possible bias that results from belonging or not to the euro area.

Table 3.2 resumes the variables included in our specification model.

Variable		**Source**	**Description**
Exchange rate risk	VFOREX	Bank for International Settlements	Standard deviation of the effective exchange rate
Degree of financial liberalization	RESTRIC	Economic Freedom Network	Capital control measure, 0 (closed) - 10 (fully open)
Degree of openness	OPEN	World Bank	Sum of exports and imports as a share of GDP
Gross domestic product	GDP	World Bank	Log of GDP
Market capitalization	MKTCAP	Datastream	Log of domestic market capitalization
Average local market return	RLOCAL	Datastream	3-year moving average of domestic equity market returns
Average local market volatility	VOL	Datastream	3-year moving average of standard deviation domestic equity market
Diversification Potential	DIVPOT	Datastream	Ratio between domestic and Europe stock market volatilities
Dummy Euro introduction	DEURO	-	1 – 1997 to 2001; 0 – other wise
Dummy Crisis	DCRISIS	-	1 – 2007 to 2009; 0 – other wise
Dummy Euro Area	DEA	-	1 – countries based inside euro area; 0 – other countries
Dummy PIGS	DPIGS	-	1 – Portugal, Italy, Greece and Spain; 0 – other countries
Euronext platform	EURONEXT	-	1 – Stock market belongs to Euronext; 0 – other wise

Table 3.2 - Variable Definition

[27] However, in order to check the robustness of our change, we have also run a specification similar to one originally proposed by Thapa et al. (2013).

The first independent variable (VFOREX) is the exchange rate risk which is expected to have a positive relationship to the home (euro) bias. Following Carrieri et al. (2006) we proxy forex risk with the standard deviation of the rolling 36 monthly observations of the effective exchange rate obtained from the Bank for International Settlements (BIS)[28].

In order to capture the degree of financial liberalization, we use the capital control intensity measure from the Economic Freedom Network (RESTRIC), also used by Chan et al. (2005). The variable ranges between 0 and 10, where 10 corresponds to a fully open market to foreign investments.

We also included the degree of openness of the economy (OPEN), following Mishra (2015), measured by the ratio of (Exports+Imports) to Gross Domestic Product (GDP). We obtained this data from the World Bank.

To capture the economic development, we use the log of GDP (GDP) also obtained from the World Bank. To proxy the development of the equity market, we use the log of market capitalization (MKTCAP) obtained from Thomson Reuters' Datastream.

In order to capture the effect of market conditions on investment decisions, we consider the 3-year moving average of the domestic market return (RLOCAL) and domestic equity market return volatility (VOL) also measured by a 3-year moving average of the standard deviation of the stock market returns. This data was obtained from Thomson Reuters Datastream.

Another important driver of investment in foreign assets is the potential diversification abroad when compared to the domestic investment opportunity set. Following the guidance of MSCI (2015) we use, as proxy of diversification opportunities, the measure Diversification Potential (DIVPOT), which is given by the ratio between the domestic volatility and the volatility of an European index. The ratio captures the volatility reduction that is achievable by investing in a diversified portfolio of European stocks instead of only holding domestic stocks. The volatility measures refer, respectively, to the MSCI domestic and the MSCI Europe indices. The data was obtained from Datastream.

[28] Previous studies, in other to access exchange rate risk, also presented other proxy alternatives, e.g., the value at risk (VaR) model (Papaioannou, 2006).

To capture time and location effects, we use five different dummy variables. The first one is a dummy to capture the effect of the euro introduction (DEURO). It takes the value 1 between 1997 and 2001 and 0 otherwise. The second one is a dummy also used by Thapa et al. (2013) that captures the effect of the financial crisis that started in 2007 (DCRISIS). It takes the value 1 for the period between 2007 and 2009 and 0 otherwise.

The third is a dummy that takes the value of 1 if the fund is domiciled in a country that belongs to the euro area and 0 otherwise (DEA). The fourth dummy refers to a group of countries that were more affected by the recent financial crisis, inside the euro area: Portugal, Italy, Greece, and Spain. The dummy (DPIGS) takes the value of 1 if the country is Portugal or Italy or Greece or Spain and 0 otherwise.

The last dummy tries to capture the effect of common trading platforms (EURONEXT). It takes the value of 1 if the fund operates in a country whose domestic stock market belongs to the Euronext group and 0 otherwise.

Lastly, considering that the introduction of the euro caused by structural changes, as mentioned in the previous literature, we enhance our model adding two interaction terms. The first is the interaction between the variables VFOREX and DEURO to account for the fact that the effects of the volatility of the exchange rate may have changed after the euro introduction. Additionally, we include an interaction variable between RESTRIC and DCRISIS as the financial crisis may have had a different impact depending on the degree of financial liberalization, meaning that funds based in countries with less financial liberalization, and therefore with lower spillover effects, may have been less affected.

3.3 Preliminary Results

3.3.1 Summary Statistics

As mentioned before, in Section 3.2.2, for a more intuitive understanding of the bias, we show the direct difference between actual and optimal weights (ACT_i - $BENCH_i$). Tables 3.3, 3.4 and 3.5 show the summary statistics for, respectively, the variables *DIFHOME, DIFEURO AREA, DIFEURO AREA EXCL. HOME*. Table 3.6 shows the summary statistics for the financial stocks (*DIFFINANCIALS*).

As already shown in Table 3.1, there are wide differences across countries in terms of the percentage that funds invest in home assets. The difference between the actual

weights in home assets and the respective theoretical levels differs across countries as shown in Table 3.3. Standard deviation figures show that even for the funds domiciled in the same country there are substantial differences in the allocation strategy in what regards home and non-home assets, also reinforced by the gap between mean and median. Differences could be partially explained by the fact that funds included in our sample have distinct strategies, objectives, or even investment charter restrictions.

Finally, while the overinvestment in home assets is in line with the previous literature, it is higher for funds based outside the euro area. This may reflect the effect reported by Balli et al. (2010), a switch of home bias to euro bias in the funds based within the euro area, caused by the euro introduction that was not observed for funds based outside the euro area.

Median figures are below the mean suggesting that there are outlier funds in every country (except for Greece) overinvesting heavily in home assets.

Country (fund domicile)	**Mean**	**Median**	**Std. Deviation**	**Kurtosis**	**Skewness**
Austria	13.9%	0.9%	30.9%	3.37	2.27
Belgium	10.3%	1.9%	23.3%	7.46	2.94
Denmark	17.0%	0.1%	34.7%	1.16	1.75
Finland	41.0%	17.8%	42.6%	(1.77)	0.28
France	40.6%	36.3%	37.7%	(1.58)	0.14
Germany	26.9%	13.3%	32.9%	(0.08)	1.14
Greece	84.0%	96.4%	30.5%	3.02	(2.18)
Ireland	3.1%	-0.1%	14.7%	35.05	6.02
Italy	35.9%	11.7%	40.6%	(1.47)	0.61
Luxembourg	5.2%	-0.1%	18.5%	15.10	4.03
Netherlands	16.4%	3.1%	30.3%	2.12	1.93
Portugal	33.5%	8.3%	42.2%	(1.24)	0.78
Spain	50.7%	48.0%	39.2%	(1.73)	(0.01)
Sweden	45.9%	45.3%	32.5%	(1.24)	(0.02)
Switzerland	4.0%	0.0%	10.4%	11.95	2.95
UK	34.8%	17.3%	41.1%	(1.58)	0.41

Region	**Mean**	**Median**	**Std. Deviation**	**Kurtosis**	**Skewness**
Euro Area	30.5%	8.2%	39.0%	(1.02)	0.86
Non Euro Area (Europe)	34.7%	18.1%	39.9%	(1.52)	0.43
Total	32.5%	11.8%	39.5%	(1.30)	0.65

Table 3.3 - DIFHOME (Actual minus Benchmark domestic holdings) by Fund Domicile Country

Table 3.4 reinforces the findings of Balli et al. (2010). Funds based inside the euro area are biased towards euro area assets. On average, the difference between actual holdings and reference holdings is more than 40 percentage points (pp) and this also the case for the median fund (almost 45 pp). For funds based outside the euro area, the mean suggests over investment in euro area assets, yet the median is negative, reflecting differences across funds. However, as shown in Table 3.5, the large exposure to euro area assets is mainly caused by domestic holdings, reducing the difference from the theoretical values from more than 40 pp to slight above 10 pp. If for funds based in France or Germany that exposure could be justified by the size of their domestic markets, for funds in countries like Portugal and Spain there must be other factors that justify the overinvestment in the local market.

Country (fund domicile)	**Mean**	**Median**	**Std. Deviation**	**Kurtosis**	**Skewness**
Austria	26.1%	23.3%	35.1%	(1.15)	0.41
Belgium	38.3%	39.2%	34.1%	(1.18)	(0.18)
Denmark	7.8%	-3.2%	28.6%	0.74	1.29
Finland	45.8%	53.6%	34.8%	(1.01)	(0.61)
France	48.6%	63.3%	38.6%	(1.14)	(0.66)
Germany	38.9%	39.9%	36.0%	(1.37)	(0.13)
Greece	73.7%	81.6%	22.8%	6.45	(2.75)
Ireland	18.0%	19.0%	31.1%	(0.97)	0.40
Italy	47.7%	56.3%	36.6%	(1.25)	(0.48)
Luxembourg	24.9%	18.7%	32.5%	(0.71)	0.55
Netherlands	30.1%	13.5%	36.1%	(1.37)	0.43
Portugal	52.8%	73.0%	38.2%	(0.80)	(0.90)
Spain	64.8%	80.1%	25.8%	1.10	(1.38)
Sweden	0.1%	-5.6%	18.0%	3.17	1.87
Switzerland	14.6%	21.2%	24.7%	(1.76)	(0.06)
UK	6.5%	-9.7%	29.3%	0.11	1.17

Region	**Mean**	**Median**	**Std. Deviation**	**Kurtosis**	**Skewness**
Euro Area	42.4%	44.9%	37.3%	(1.40)	(0.30)
Non Euro Area (Europe)	5.7%	-7.2%	27.9%	0.47	1.27
Total	24.9%	14.6%	37.8%	(1.39)	0.39

Table 3.4 - DIFEUROAREA (Actual minus Benchmark Euro area holdings) by Domicile Country

Country (fund domicile)	Mean	Median	Std. Deviation	Kurtosis	Skewness
Austria	11.9%	2.3%	28.7%	(0.27)	0.84
Belgium	27.4%	32.3%	31.1%	(1.06)	0.15
Denmark	7.8%	-3.2%	28.6%	0.74	1.29
Finland	4.1%	-14.1%	28.9%	0.16	1.21
France	3.1%	-5.0%	21.2%	0.49	1.19
Germany	8.3%	0.1%	23.5%	(0.51)	0.76
Greece	-10.6%	-14.7%	14.2%	17.04	4.09
Ireland	14.8%	11.3%	29.3%	(0.86)	0.47
Italy	10.1%	-3.1%	28.5%	(0.29)	0.96
Luxembourg	19.6%	15.6%	30.7%	(0.19)	0.80
Netherlands	12.0%	0.7%	29.0%	0.42	1.24
Portugal	19.2%	6.9%	36.3%	(1.39)	0.43
Spain	12.5%	1.9%	27.7%	(0.64)	0.76
Sweden	0.1%	-5.6%	18.0%	3.17	1.87
Switzerland	14.6%	21.2%	24.7%	(1.76)	(0.06)
UK	6.5%	-9.7%	29.3%	0.11	1.17

Region	Mean	Median	Std. Deviation	Kurtosis	Skewness
Euro Area	10.1%	-1.1%	28.3%	(0.19)	0.94
Non Euro Area (Europe)	5.7%	-7.2%	27.9%	0.47	1.27
Total	8.0%	-4.3%	28.2%	0.07	1.09

Table 3.5 - DIFEURO AREA EXCL. HOME (Actual minus Benchmark euro area holdings excluding Home) by Domicile Country

Regarding industry differences, we do not report all results here to save space, but they are available upon request. Overall, the difference between actual and reference allocations are lower.

Funds based within the euro area focus more on utility and financial industries and funds based in other European countries, outside the euro area, invest more in health and consumer industries reinforcing once again the idea that the location of the fund may affect the portfolio allocation strategy.

Table 3.6 shows the summary statistics for the financial industry. Funds based in Ireland display weights very close to the reference while for funds based in Greece, the difference is close to 7 pp. On a regional basis we find that the funds based within the euro area, on average, overinvest in financial stocks, while other European funds, outside euro area, underinvest in those stocks. Once again, the median figures show for both an

underinvestment, reinforcing the high level of discrepancy even inside the same region/country.

Country (fund domicile)	Mean	Median	Std. Deviation	Kurtosis	Skewness
Austria	6.5%	0.6%	22.0%	3.25	1.93
Belgium	3.6%	-1.2%	19.5%	4.07	2.04
Denmark	-3.5%	-4.5%	14.3%	19.59	3.90
Finland	-6.8%	-10.3%	17.0%	6.68	2.55
France	6.2%	-1.4%	23.0%	2.31	1.76
Germany	-3.4%	-4.2%	14.3%	11.18	2.50
Greece	7.4%	6.6%	13.9%	(0.07)	0.36
Ireland	0.7%	-1.2%	12.4%	0.69	0.77
Italy	2.4%	0.7%	9.0%	(0.29)	0.30
Luxembourg	-7.4%	-6.5%	15.6%	9.35	2.07
Netherlands	3.9%	-1.7%	24.5%	1.89	1.58
Portugal	3.5%	-2.6%	24.0%	3.21	1.98
Spain	3.9%	-1.7%	24.5%	1.89	1.58
Sweden	-4.3%	-3.5%	6.4%	2.00	(0.69)
Switzerland	-4.3%	-3.5%	6.4%	2.00	(0.69)
UK	-3.7%	-4.0%	9.8%	18.35	2.74

Region	Mean	Median	Std. Deviation	Kurtosis	Skewness
Euro Area	1.3%	-1.9%	19.0%	5.02	2.02
Non Euro Area (Europe)	-3.7%	-3.9%	10.0%	20.87	3.04

Total	-0.9%	-3.0%	15.9%	8.82	2.51

Table 3.6 - DIFFINANCIALS (Actual minus Benchmark Financial stocks holdings) by Domicile Country

In order to determine if the bias for funds belonging or not to the euro area and belonging or not to Portugal, Italy, Greece and Spain is statistically different, we perform a t-test for the mean differences between different location and industry subsamples.

Table 3.7 shows the results. The t-test indicates that the means are different, significant at 1% level.

ACT-BENCH	Test	Mean Difference	p-value
DIFHOME	Euro Area vs. Non Euro Area funds	-4.20%	0.000
DIFEURO AREA	Euro Area vs. Non Euro Area funds	36.66%	0.000
DIFEUROPE[29]	Euro Area vs. Non Euro Area funds	-33.63%	0.000
DIFHOME	PIGS vs. Non PIGS funds	22.12%	0.000
DIFEURO AREA	PIGS vs. Non PIGS funds	41.62%	0.000
DIFEUROPE[27]	PIGS vs. Non PIGS funds	-27.07%	0.000

Table 3.7 - Location Effects (Actual minus Benchmark holdings)

We also perform the same test for the industry subsamples. Table 3.8 shows the results for the financial holdings (results not fully reported, but available upon request). As expected, the differences between groups are smaller but significant at 1% level.

ACT-BENCH	Test	Mean Difference	p-value
DIFFINANCIALS	Euro Area vs. Non Euro Area funds	4.96%	0.000
DIFFINANCIALS	PIGS vs. Non PIGS funds	5.73%	0.000

Table 3.8 - Industry Effects (Actual minus Benchmark holdings)

Table 3.9 summarizes the descriptive statistics for the parameters associated with the variables included in the home (euro) bias model.

[29] Actual minus Benchmark European holdings excluding Euro Area stocks holdings.

Variables	Mean	Median	Minimum	Maximum	Std. Deviation	Kurtosis	Skewness
VFOREX	2.99	2.21	0.42	11.42	2.50	1.92	6.12
RESTRIC	7.48	7.65	5.37	8.60	0.76	-1.19	3.66
OPEN	0.67	0.55	0.03	3.56	0.45	3.55	18.94
GDP	5.00	5.52	2.74	5.98	0.95	-1.46	3.92
MKTCAP	11.87	12.10	10.35	12.59	0.61	-0.84	-0.73
RLOCAL	0.02	0.01	-0.10	0.16	0.03	0.34	3.29
VOL	0.10	0.09	0.02	0.31	0.05	0.82	4.17
DIVPOT	1.10	1.00	0.51	6.37	0.43	1.79	12.61

Table 3.9 - Summary Statistics

3.3.2 Correlation

Table 3.10 shows the correlation matrix for the independent variables used in the empirical model. The results show that correlation coefficients between variables are not very high suggesting that multicollinearity is not an issue. Yet some additional tests have been performed in order to ensure that multicollinearity does not affect the results. These tests are presented later in the robustness section.

	VFOREX	RESTRIC	OPEN	GDP	MKTCAP	RLOCAL	VOL	DIVPOT	DEURO	DCRISIS	DEA	DPIGS	EURONEXT
VFOREX	1												
RESTRIC	-0.13	1											
OPEN	-0.27	0.00	1										
GDP	0.28	0.11	-0.22	1									
MKTCAP	-0.12	-0.00	-0.07	-0.19	1								
RLOCAL	-0.01	-0.44	0.01	0.01	0.02	1							
VOL	-0.34	0.05	0.19	-0.31	-0.09	-0.42	1						
DIVPOT	-0.27	-0.38	0.16	-0.34	-0.05	0.21	0.56	1					
DEURO	0.12	-0.65	-0.12	-0.02	0.13	0.57	-0.11	0.27	1				
DCRISIS	0.06	0.14	0.10	0.02	0.01	0.22	-0.43	-0.14	-0.33	1			
DEA	-0.52	-0.22	0.29	-0.63	0.12	-0.01	0.42	0.47	-0.05	0.04	1		
DPIGS	-0.24	-0.21	-0.11	0.01	-0.04	0.05	0.14	0.19	-0.02	0.01	0.39	1	
EURONEXT	0.32	0.16	-0.21	0.49	0.24	-0.07	-0.47	0.54	0.01	-0.01	-0.46	-0.18	1

Table 3.10 - Correlation Matrix

As expected, we get a negative relation between the euro introduction and the capital control intensity measure and a negative relation between the proxy for exchange rate risk and the dummy associated with funds belonging to the euro area.

3.4 Empirical Results and Analysis

In this Section, we present the empirical results of the regressions for HB and EB models.

3.4.1 Home Bias

Since we have observations for a sample of European mutual funds based in sixteen different countries over a period from June 1997 to June 2011, we used the EGLS panel regression technique with cross-section weights[30]. The estimation of a feasible GLS specification is advantageous since estimations are robust in case of the presence of heteroskedasticity or autocorrelation. In order to understand the impact of belonging or not to the euro area we also run the regression for two subsamples: (i) funds based in countries that belong to the euro area (EA) and (ii) funds based in other European countries but outside the euro area (NEA).

Table 3.11 shows the results. Overall, we have a high level of statistical significance for the variables included in the model and a reasonable quality of adjustment.

	Home Bias		
	Total	**EA**	**NEA**
Intercept	0.750***	0.724***	-3.616***
VFOREX	0.005***	0.002	0.008***
RESTRIC	-0.047***	-0.065***	-0.005
OPEN	-0.078***	-0.073***	0.069**

[30] EGLS application with cross-section weights is supported by the result of the Hausman test which shows that random effects should not be used.

	Home Bias		
	Total	**EA**	**NEA**
GDP	-0.025***	-0.027***	0.678***
MKTCAP	-0.002***	-0.005***	0.003***
RLOCAL	0.941***	1.041***	0.078
VOL	0.731***	0.886***	-0.148
DIVPOT	0.030***	0.019***	0.029***
DEURO	-0.030***	-0.112***	0.034***
DCRISIS	1.009***	0.881***	0.422***
DEA	-0.198***	-	-
DPIGS	0.336***	0.348***	-
EURONEXT	0.013***	0.010***	0.122***
VFOREX*DEURO	-0.014***	0.021***	-0.007***
RESTRIC*DCRISIS	-0.130***	-0.114***	-0.059***
Adjusted R-squared	41.33%	40.21%	20.65%
N. of Observations	45,785	23,898	21,887

***significant at 1% level
**significant at 5% level
*significant at 10% level

Table 3.11 - Home Bias Results (Model 3.3)

Considering the location impact, our model shows that for funds based within the euro area, the home bias is on average, 0.198 points lower than for funds based outside the euro area. Yet, for funds based in Portugal, Italy, Greece and Spain the results are different: the bias is 0.336 higher. These findings suggest different levels of financial integration, not only outside but even inside the euro area.

As expected, we find a positive impact of the euro introduction in the reduction of the home bias. That effect could be partly explained by the elimination of exchange rate risk, the creation of common platforms and the removal of restrictions on capital flows, noticed for those that belong to the euro area and confirmed by the effect of the proxies used (*DEURO* and *VFOREX*DEURO*). On the other hand, we find, as expected, an increase of the home bias driven by the recent financial crisis. That impact could be justified by the increase of correlation between euro area assets decreasing the diversification incentives to invest abroad.

However, this effect is not clear, investors do not seem to benefit from the potential diversification by investing in a diversified portfolio of European stocks, maintaining a considerable level of home bias.

Additionally, we also find that a higher level of development and higher degree of openness of the economy are associated with lower levels of home bias. Those findings are in line with previous literature that states that a higher degree of openness leads to an increase of information reducing the risks of foreign investments. We also observe a significant and higher coefficient of the RLOCAL variable, suggesting positive recent returns of the domestic markets are associated with higher levels of home bias.

Also curious and worth to highlight is the positive reaction to domestic equity market return volatility. If positive return of domestic markets increases the level of home bias, volatility of those markets should have a negative impact, yet not verified. This result could be driven by the false sensation of protection when investing in more well-known stocks.

Finally, when looking at the results of the subsamples, we find that funds based in countries outside the euro area, increased the levels of home bias after the euro introduction. That impact could be justified by the less diversification opportunities inside the euro area. If the potential of diversification decreases, the transaction costs may not justify investing abroad. Additionally, the level of home bias for investors based outside the euro area do not seem to be sensitive to returns of the domestic markets, so for those investors, other drivers seem to be more relevant in allocation selection.

3.4.2 Euro Bias

In Table 3.12 we present the results for the euro bias model. The first aspect worth highlighting is a significant increase of quality of adjustment.

Euro Bias			
	Total	**EA**	**NEA**
Intercept	0.029*	0.624***	0.970***
VFOREX	0.001***	0.05***	0.002***
RESTRIC	-0.001	-0.026***	0.010***
OPEN	-0.059***	-0.064***	0.079***
GDP	-0.014***	-0.010***	-0.199***
MKTCAP	-0.001***	-0.003***	0.001**
RLOCAL	0.509***	0.781***	0.059
VOL	0.387***	0.671***	0.065
DIVPOT	0.016***	0.011**	0.007
DEURO	0.011***	-0.075***	0.007
DCRISIS	0.290***	0.606***	0.081
DEA	0.433***	-	-
DPIGS	0.372***	0.360***	-
EURONEXT	0.056***	0.064***	0.010
VFOREX*DEURO	-0.004***	0.024***	-0.001
RESTRIC*DCRISIS	-0.038**	-0.080***	-0.012
Adjusted R-squared	72.22%	43.53%	3.55%
N. of Observations	45,785	23,898	21,887

***significant at 1% level
**significant at 5% level
*significant at 10% level

Table 3.12 - Euro Bias Results (Model 3.3)

From a location perspective, our results are also in line with the previous literature that states an increased preference for euro area assets, especially for funds based in countries within the euro area. Our model shows that funds based in countries within the euro area have a 0.433 higher degree of euro bias. Additionally, in line with our findings for home bias, funds based in Portugal, Italy, Greece and Spain have even more over preference for euro assets which is directly translated in higher degree of euro bias. The impact of common platforms is also positive and statistically significant.

When looking at the subsamples regression estimates, we find that the phenomenon of euro bias is a characteristic of funds based in countries within the euro area. For funds based in countries outside the euro area, we find a low quality of adjustment and some parameters are not statistically significant. For funds based in countries within the euro area, we find a slight reduction of euro bias, driven by the euro

introduction, which we did not expect. The shift from home to euro bias, described by previous literature, should not be an one off consequence of the euro introduction but a longer term effect caused not only by the elimination of exchange rate risk but also because of other effects such as the introduction of common trading platforms.

Finally, we notice that like the home bias, exposure to euro assets could indeed be justified by recent positive performance of home returns or its volatility or even by an increase in the benefits of diversification proved by the coefficient of the DIVPOT variable. While we are using euro bias as proxy for financial market integration it is important to understand that this is an indirect measure and holdings over time may reflect other factors, such as market conditions.

3.4.3 Industry Analysis

Industry holdings analysis is performed for the period between 4Q07 and 2Q11, so limited to the most recent period, around the financial crisis.

As already mentioned in Section 3.3.1, the industry allocation of the European investment funds seems to be more aligned with the ICAPM allocation reference.

Although immaterial, some biases are still worth to highlight. Overall, we find overinvestment in industries like health care and consumer and underinvestment in industries like technology and industrials. Comparing funds based in countries within the euro area with funds based in other European countries, we find that funds based outside the euro area overinvest in health care and consumer industries. On the other hand, funds based within the euro area overinvest in financial and utilities industries. This allocation could reflect geographical preferences (if the respective domestic markets are more exposed to those industries) but the other way around is also plausible (if funds want to get exposure to some industries, they may need to invest in some particular markets).

Funds based in Portugal, Italy, Greece and Spain on one side, show a higher exposure to financial holdings, especially funds based in Greece, but on the other hand there seems to be a more accentuated reduction in these exposures with the beginning of the financial crisis. While, as mentioned, the overall deviation from the ICAPM allocation

reference level is trivial. Funds based in Portugal, Italy, Greece and Spain show over exposure to the financial industry, which has not changed, even after the shock of the financial crisis. Excluding Italy, the other countries continue to show an over exposure again to the financial industry especially after mid-2010.

This overexposure to the financial industry could merely reflect the weight of these industries in the domestic markets of these countries and the fact that they display high levels of home bias.

The previous literature that has analyzed euro area financial integration in the period of the financial crisis, such as Inklaar et al. (2012), Pungulescu (2013), Bekaert et al. (2013) and Gibson et al. (2014), is not consensual in terms of the impact of the financial crisis on financial integration.

Generally, our results indicate a higher level of euro bias after the financial crisis suggesting that the crisis led to an intensification of the integration inside the euro area, reinforcing thus the conclusions presented in chapter two.

3.4.4 Robustness Tests

In order to assess the robustness of our results, we perform additional tests. To evaluate whether the large number of the UK funds in our dataset could be driving the results, we run all models excluding all funds based in the UK. The results are available upon request. Overall, we get the same conclusions.

Given that this study is a follow up on the work reported on chapter 2. Results, using a return-based approach, suggest an intensification of the financial integration following the euro introduction; and a negative impact initiated just before the financial crisis and different behavior for funds domiciled in different locations suggesting partial financial segmentation. We perform a comparative test in order to check if those results held using a holdings-based approach. Since we used two different datasets, we select a subsample of the current dataset with funds included in the dataset used in Chapter 2. That sample included funds that invested in Europe and mainly (more than 70%) inside the euro area. Applying the same restrictions to the current dataset we reduce the number of

funds from 1,062 to only 147. Results, using the same methodology[31] are displayed on Table 3.13.

For the both specifications, we observe an increase of the adjusted R^2. However, funds that allocate their wealth only in Europe (mostly in euro area) show different reaction to a few drivers. For the home bias model, this specific sub group does not show a statistically significant reaction to the introduction of the euro and to the financial crisis. However, for the euro bias model, we find a stronger effect associated with the introduction of the euro. Overall, the test allows us to reinforce that within Europe there are different levels of financial integration.

	Home Bias		**Euro Bias**	
	Total	**147 Funds**	**Total**	**147 Funds**
Intercept	0.750***	0.292***	0.029*	0.384***
VFOREX	0.005***	-0.003***	0.001***	0.003***
RESTRIC	-0.047***	0.06***	-0.001	0.011***
OPEN	-0.078***	-0.074***	-0.059***	-0.003***
GDP	-0.025***	0.001	-0.014***	-0.001**
MKTCAP	-0.002***	0.004***	-0.001***	0.001***
RLOCAL	0.941***	0.190***	0.509***	-0.271***
VOL	0.731***	-0.434***	0.387***	-0.003
DIVPOT	0.030***	-0.016***	0.016***	-0.022***
DEURO	-0.030***	0.016	0.011***	0.049***
DCRISIS	1.009***	0.407	0.290***	0.040***
DEA	-0.198***	-0.145***	0.433***	-0.002***
DPIGS	0.336***	-0.080***	0.372***	0.004***
EURONEXT	0.013***	-0.027***	0.056***	0.001
VFOREX*DEURO	-0.014***	0.003***	-0.004***	-0.001
RESTRIC*DCRISIS	-0.130***	-0.056***	-0.038**	-0.011***
Adjusted R-squared	41.33%	93.12%	72.22%	77.54%
N. of Observations	45,785	5,834	45,785	5,834

***significant at 1% level
**significant at 5% level
*significant at 10% level

Table 3.13 - Robustness Test

[31] Given that these funds only invest in Europe, we consider an European index calculated by Thomson Reuters' Datastream instead of the world index, to calculate the benchmark holdings.

Finally, as mentioned in Section 3.3.2, in order to avoid any possible doubt of bias resultant from multicollinearity, we rerun our model excluding the variables with correlation coefficient above 0.5, such as the DEURO and DEA. The results, available upon request, are robust and thus not affected by any multicollinearity.

3.5 Summary and Main Conclusions

This chapter is a follow up to the analysis presented in chapter 2. We analyze the portfolio holdings of a sample of European mutual funds to assess the impact of euro introduction and of the 2007-08 financial crisis. By examining directly the impact of these important events on portfolio weights we aim at indirectly assessing how the level of financial integration has changed over time, looking at home and euro bias.

We test an empirical specification, based on the arguments that have been put forward to account for home bias.

Our findings show that funds based in countries within the euro area have lower home bias, suggesting a higher level of financial integration inside the area. Moreover, we find that the decrease in the levels of home bias occurs along with the introduction of the euro. That finding is also validated by a higher degree of euro bias, which means that euro area investors seem to behave as euro area investors, especially after the euro introduction. This evidence is consistent with the "local bias" phenomenon identified by previous studies.

Yet, we find different behaviors even within the euro area. Funds based in Portugal, Italy, Greece and Spain exhibit excess investment in domestic assets suggesting different levels of financial integration in countries within the euro area.

At the industry level, the level of bias is smaller. Yet, funds based outside the euro area show an over preference for non-tradable industries which along with a higher level of home bias, suggest a lower level of financial integration.

We find that along with a smooth increase of home bias, the financial crisis also leads to adjustments in the portfolio allocation, increasing investment in industries like health care and energy and a reduction in financial stocks and stocks in industries more directly linked to the economic cycle.

4. THE CORPORATE OWNERSHIP LEVEL OF EUROPEAN INVESTMENTS FUNDS AND FINANCIAL MARKET INTEGRATION

4.1 Introduction

The empirical phenomenon of preference for domestic equities (Home Bias), well above the level that could be justified by portfolio theory, has puzzled academics for decades (Cooper et al., 2013). Most of the previous studies that examine Home Bias (HB) focus on the relative weight of domestic/foreign portfolio holdings on total holdings but disregard the strength of that investment in terms of ownership. Different theoretical arguments, such as the Corporate Insider Theory, may provide additional insights on financial integration exploring differences in domestic/foreign ownership levels (Stulz, 2005, Kho et al., 2009, Lozano et al., 2016).

The ownership perspective brings about a new set of arguments that may help to explain the excessive preference for domestic assets. To start with, investors only buy non-domestic assets if they are available to trade, so free float and liquidity may have an important impact on the investor's decision. This is related to ownership concentration. For example, in many European countries, companies are controlled by one single family resulting thus in reduced free float (Lozano et al., 2016, Kho et al., 2009). Companies that have a major shareholder that often has control of the company may deter corporate foreign ownership, in particular, by institutional investors. Arguments related to agency issues and expropriation risk must thus be considered (Stulz, 2005, Germanova et al., 2015). There may be conflict of interests between the controlling and other shareholders that could be more pronounced in countries with poor protection of minority shareholders given than controlling shareholders could extract private benefits, maximizing their own welfare rather than the welfare of all shareholders (La Porta et al., 1999, Stulz, 2005)[32]. In extreme types of ownership, such as family-owned businesses, independent directors

[32] Previous studies show that minority shareholders are typically more protected in countries of common law and with a stronger corporate governance mechanism (Lozano et al., 2016).

and effective protection of minority rights are even more necessary to minimize the conflict of interests (Germanova et al., 2015).

Despite all the limitations to invest abroad and the persistent over preference for domestic assets, the allocation in foreign assets increased over the last decades as documented in chapter one. Gal (2015), for example, analyses the spatial features of the financial markets, considering primarily the increasing globalization and the development of the euro area's financial markets. The author shows that, despite the predominance of domestic markets, portfolio allocation in foreign assets increased from 5% in 1980 to 20% in the mid-2000. Yet, this level of allocation abroad is extremely heterogeneous across countries (Wojcik, 2002).

Shareholders are typically divided into two segments: institutional investors and retail investors, however when the focus is the motivation for cross-border ownership, previous literature divides shareholders in financial[33] and non-financial investors (Wojcik, 2002, La Porta et al., 1999, Stulz, 2005). Wojcik (2002) states that financial institutions invest abroad in order to achieve the necessary international diversification and to reduce portfolio risk. This investment is usually made through foreign shares acquisition on secondary markets (Wojcik, 2002). On the other side, non-financial investors invest in foreign companies in order to have a lasting impact on the companies' business and investment is many times made through merger and acquisition operations (Wojcik, 2002, Kalemli-Ozcan et al., 2014, Dahlquist and Robertsson, 2001).

Controlling for the different characteristics and preferences of investors, in a full financial market integration, companies should display identical level of foreign ownership (Stulz, 2005). Lower levels of cross-border corporate ownership could thus reflect financial market segmentation (Gal, 2015). The corporate ownership structure could thus be informative about the level of financial market integration.

Nevertheless, it is important to understand that several other factors, not directly related to the degree of financial market integration, influence and may justify the levels of foreign ownership. For example, agency problems could affect either home or foreign investments denoting that an institutional investor, who only invests in companies with

[33] Financial institutions are, e.g., banks, insurance companies, pensions funds and mutual funds.

high corporate-governance standards, may be constrained to invest more or less in home or in foreign companies not because of the level of integration/segmentation but due to own preferences. Even if there are different behaviors by euro area and non-euro area funds that difference could merely reflect investor preferences. For example, if an institutional investor based in a common law country does not wish to deal with agency problems and prefers investing only in companies based in countries with common law regimes, he will allocate a huge part of his investment domestically when the alternatives are foreign stocks from family-owned companies located in a civil law country. Even institutional investors in the civil law countries may avoid buying domestic stocks given limited free float and risk of expropriation of those investments. The resulting ownership levels may thus not reflect financial market segmentation, per se, but may deter financial market integration given that risk sharing will be limited and pricing rules will therefore reflect that.

The proportion of European mutual funds with foreign assets in their portfolio increased from 10% in 1975 to almost 50% in 2012 but major differences across European countries persist. Davydoff et al. (2013) reports that the proportion of funds investing abroad varies between 10% and 60%. Germanova et al. (2015) show that, by 2015, foreign investment in European companies is, on average, 22%.

Previous studies evaluate portfolio holding and how investors have changed their exposure to domestic or foreign assets through time. We evaluate the ownership level of domestic/foreign companies over time. This evidence may help us understand if and to what extent the level of financial market integration has changed over the last decade. We look at European stocks ownership levels and focus on institutional investors[34] which are nowadays the dominant shareholders in the world stock markets (Pool et al., 2012).

We conduct an exploratory analysis using a dataset of mutual funds portfolio holdings from Thomson Reuters. This dataset covers 1,063 funds domiciled in 16 different European countries, from 1997 to 2011, investing worldwide.

[34] According to Investment Company Institute (2015) and the International Investment Funds Association (2016), by the end of 2016, there were almost 80.000 funds managing over USD 37 trillions of assets representing USD 16 trillion invested.

We analyze the portfolio holdings to understand how investors allocate their wealth and, specifically, their ownership preferences. We propose a model to assess the determinants of the ownership levels in domestic and foreign stocks through time across mutual funds.

Our results confirm the expected correlation between the size of the portfolio and the ownership level. Additionally, we observe a rather constant level of domestic and cross-border ownership that was only barely affected by the great financial crisis.

This latter finding could be justified by the relevant number of family-owned companies particularly in Europe. This feature may reduce the attractiveness for external and foreign investors due to the limited free float[35], expropriation risk, especially in companies operating in countries with poor corporate governance standards.

Overall, our findings seem to support imperfect financial market integration. We find that investors based inside the euro area show a constant lower level of ownership despite allocating the largest stake of their portfolios to euro area stocks. The different behavior between funds located inside the euro area and those in other European countries, outside the euro area, is underlined by the different responses to some of the main drivers of corporate ownership levels. Yet, not only some estimates are not in line with corporate insider theory implications but also there are regression estimates for subsamples that are inconsistent suggesting that our model specification is not able to properly capture the time-series and cross-sectional variability of corporate ownership of European investment funds.

Therefore, one needs to stress that the ownership approach and, to some extent of the holdings approach is limited and an indirect measure of financial integration.

The remainder of the chapter is organized as follows. Section 2 describes the data and the empirical methodology we use to evaluate domestic and corporate ownership levels over time and across funds domiciled in different European countries. Section 3 presents the main results and Section 4 includes the main conclusions and final remarks.

[35] Free float is the percentage of the available shares that are not held by controlling shareholders.

4.2 Data, Methodology and Variables

4.2.1 Sample Description

We use a Thomson Reuters dataset that comprises 1,063 investment funds. These investments funds are based in Europe, in 16 different countries[36], without any limitation on their investment scope (geographic, style, industry). 56% of the funds in our sample are based inside the euro area.

One important feature of the dataset is that it includes solely the equity holdings of the portfolio. The funds do not have any limitation to the type of financial assets that they could invest in. Given that these are equity funds, stocks represent most of its investments. Yet, these funds could shift their investment from equity to other kind of financial assets like bonds or derivatives or cash. The data set only includes information about the equity component.

Portfolio holdings are available on a quarterly basis, for the period between June 1997 and June 2011. For each fund, we have information about its investment style, level of turnover and domicile. Additionally, for each stock held, the dataset includes company and market information: headquarter of the company, the industry where it belongs, the shares outstanding, stock prices, number of shares held by the fund, and the correspondent percentage of ownership.

Preliminary analysis of the 1,063 funds shows that some of these funds were highly concentrated on a few stocks with a high level of ownership[37]. For example, 35 funds had at least one share that represented more than 20% of their *TNA* and 41 funds had an ownership percentage superior to 10% in only one company. In order to avoid that these outliers affect our results, we eliminated those funds that probably were not created for investment purposes but possibly for tax reasons. We used the following criteria: (i) we eliminated funds which had a stock that represented 20% of more of its *TNA* and, (ii)

[36] The investment funds are based in: Austria; Belgium; Denmark; Finland; France; Germany; Greece; Ireland; Italy; Luxembourg; Netherlands; Portugal; Spain; Sweden; Switzerland and United Kingdom (UK)

[37] Excluding these outliers, the portfolios of the mutual funds included in our dataset are reasonably diversified, investing in average in stocks based on around 40 different locations (with a small number showing an investment in almost two hundred stocks based in different locations).

we eliminated funds that had an ownership level superior to 10% in one single stock. The final sample includes a total of 834 funds.

Based on the information available, for each holding we assess the amount invested on that stock and the correspondent ownership level. Considering the location of each holding, we cluster the observations into eleven groups. We calculate the amount invested and the correspondent weighted average ownership in stocks based in the country where the fund is registered (home stocks); in the euro area (euro area stocks excluding home and Germany); in Germany (Germany stocks); in the United Kingdom (UK); in other non-euro countries in Europe, excluding the UK; in the United States of America (US), Canada, America, Africa, Japan and Asia. All the eleven clusters are mutually exclusive, meaning that one holding is only considered in one cluster, i.e., a mutual fund based in Portugal, that invests only in Portuguese stocks, will have its holdings all classified as home stocks.

As our study addresses financial market integration in the euro area, we consider two additional classifications: Home vs. Non-Home ownership and Euro vs. Non-Euro area ownership.

Table 4.1 shows the distribution of funds by country. One third of funds are based in the United Kingdom (UK) and 56% of funds are based in four other European countries: the UK, Germany, Sweden and France. This high level of concentration is in line with figures reported by the European Fund and Asset Management Association (2016). France, Germany and the UK are the main European host countries for mutual funds. The sample reflects the size and development of these financial markets.

Country /Region	Number of funds	%	TNA M€ [Average]	%Home [Average]	%Euro Area [Average]	%Europe [Average]	Ownership [Weighted Average]	Home ownership [Weighted Average]	Euro Area ownership[38] [Weighted Average]	Europe ownership[39] [Weighted Average]
UK	282	34%	1,027	33%	16%	8%	0.09%	0.09%	0.07%	0.07%
Germany	107	13%	1,285	16%	18%	7%	0.07%	0.07%	0.05%	0.05%
Sweden	51	6%	945	41%	12%	7%	0.07%	0.22%	0.06%	0.05%
France	30	4%	1,000	35%	15%	7%	0.12%	0.10%	0.10%	0.08%
Austria	44	5%	177	4%	22%	14%	0.05%	0.05%	0.06%	0.04%
Portugal	26	3%	70	2%	24%	5%	0.09%	0.02%	0.08%	0.12%
Netherlands	39	5%	965	10%	16%	7%	0.11%	0.13%	0.06%	0.05%
Spain	32	4%	200	33%	28%	6%	0.03%	0.05%	0.03%	0.04%
Denmark	41	5%	446	10%	13%	12%	0.06%	0.07%	0.04%	0.13%
Finland	40	5%	182	47%	12%	10%	0.07%	0.08%	0.03%	0.05%
Greece	32	4%	47	77%	5%	3%	0.09%	0.10%	0.09%	0.02%
Ireland	34	4%	648	2%	24%	7%	0.06%	0.08%	0.04%	0.04%
Belgium	26	3%	477	7%	36%	8%	0.04%	0.07%	0.07%	0.03%
Luxembourg	25	3%	230	3%	23%	10%	0.04%	0.02%	0.03%	0.06%
Italy	20	2%	333	16%	17%	19%	0.04%	0.02%	0.02%	0.05%
Switzerland	5	1%	993	3%	15%	2%	0.08%	0.04%	0.08%	0.08%
Euro Area	455	55%	662	16%	19%	7%	0.08%	0.08%	0.05%	0.05%
Non Euro Area (Europe)	379	45%	951	33%	15%	8%	0.08%	0.11%	0.07%	0.07%
Total	**834**	**100%**	**803**	26%	17%	8%	0.08%	0.10%	0.06%	0.06%

Table 4.1 - Mutual Funds by Domicile Country and Region

The ownership level is very similar across all the geographies considered. At a country level, the Pearson correlation between the average size of the funds and the average ownership is 0.2. The larger mutual funds in terms of assets under management (TNA) are domiciled in the countries that host more funds.

Funds based outside the euro area have on average higher values under management (TNA), 951M€ vs. 662M€ for funds based inside the euro area, but similar ownership levels (0.08% vs. 0.08%). Funds based inside the euro area invest less in home stocks than funds based in other European countries (16% vs. 33%) and invest considerably more in euro area stocks, 19% vs. 15% (home stocks are also euro area

[38] Excluding Home and German stocks;
[39] Excluding Home, Euro Area, German and UK stocks;

stocks, for funds based in euro area countries). When we compare the ownership levels, funds based within the euro area, while allocating more in euro area stocks (19%), on average, have lower ownership levels of companies based in the euro area (0.05% vs. 0.07%).

These preliminary findings show that capital allocation of mutual funds is diverse across countries or regions where funds are based. Further analysis is conducted in section 4.3.1.

4.2.2 Methodology

Following the previous studies of Wojcik (2002) or Stulz (2005) we assume that the cross-border ownership levels are a proxy of the true levels of financial market integration. Two similar funds based in different countries should have similar portfolios. In other words, for any of those funds, the ownership level displayed for foreign stocks[40] should be close to the ownership level in similar home stocks[41], if the two regions are financially integrated. If ownership levels are higher in home stocks, this could suggest any form of market segmentation, for example, the existence of formal barriers to capital flows.

Yet, it is important to stress that different ownership levels for home and foreign stocks may not necessarily be associated with financial market integration and may merely reflect fund preferences given that there may be significant differences between domestic and foreign stocks characteristics.

Our study is thus rather exploratory. We assess whether there are differences in ownership levels between domestic and foreign stocks and propose a model that helps us explain those differences. We use the methodology followed by Thapa et al. (2013) to explain the difference between domestic and foreign ownership levels.

Our variable of interest is Ownership. For each mutual fund, we obtain the level of ownership for its holdings considering the market capitalization of each stock. Due to

[40] In companies based outside the country where the investor is domiciled.
[41] In companies based in the country where the investor is domiciled.

the size of each mutual fund portfolio, and in order to overcome limitation in computer processing, we clustered the holdings by location in eleven groups, as summarized in Table 4.2: (i) holdings of home companies, i.e., companies based in the same country of the investors (Home Ownership); (ii) holdings of companies that are based inside the euro area except German and home stocks[42] (Other Euro Area Ownership excluding Home and German stocks); (iii) holdings of companies based in Europe except Germany, home, euro area and the United Kingdom stocks (Other Europe Ownership excluding Home, Euro Area, Germany and UK); (iv) holdings of companies based in Germany except home stocks (Germany Ownership); (v) holdings of companies based in the UK except home stocks (UK Ownership); (vi) holdings of companies based in the US (US Stocks Ownership); (vii) holdings of companies based in Canada (Canada Ownership); (viii) holdings of companies based in America except US and Canadian stocks (Other America Ownership excluding US and Canada); (ix) holdings of companies based in Africa (Africa Ownership); (x) holdings of companies based in Japan (Japan Ownership); (xi) holdings of companies based in Asia except Japanese stocks (Other Asia Ownership excluding Japan). We compute a weighted average of the single holding ownership levels[43].

Ownership Clusters	**Description**
Home Ownership	Weighted average ownership in home stocks
Other Euro Area Ownership	Weighted average ownership in other euro area stocks
Other Europe Ownership	Weighted average ownership in other European stocks
Germany Ownership	Weighted average ownership in German stocks
UK Ownership	Weighted average ownership in UK stocks
US Ownership	Weighted average ownership in US stocks
Canada Ownership	Weighted average ownership in Canadian stocks
Other America Ownership	Weighted average ownership in other American stocks
Africa Ownership	Weighted average ownership in African stocks
Japan Ownership	Weighted average ownership in Japanese stocks
Other Asia Ownership	Weighted average ownership in other Asian stocks

Table 4.2 - Ownership Clusters Description

[42] For funds based inside the euro area.
[43] We weight the ownership level using the market capitalization of the stocks. As such, large (small) cap companies, for which ownership levels are lower, have higher (lower) weights.

One important feature of this clustering is that all the eleven groups are mutually exclusive, meaning that one holding is only considered in one group. That assumption must be considered especially when analyzing the amount invested, e.g., in Europe. Considering that all mutual funds are based in Europe, the amount allocated in European stocks corresponds to the sum of the amount invested in Home, Other Euro Area, Germany, Other European stocks and the UK. Furthermore, for funds based in Germany and UK we consider all the home stock investment in Home Stocks Ownership.

4.2.3 Model Specification and Variables Definition

Our empirical model allows us to evaluate which factors influence domestic and foreign (Other Euro Area, Other Europe, etc.) ownership levels and to test if those levels are affected by the introduction of the euro and the great financial crisis. Moreover, the utilization of subsamples based on fund location (inside and outside the Euro area) or investment destination also allows us to test if and how location matters to ownership.

Considering that the ownership level is related to the size of the fund and is affected by several drivers already mentioned above, we include (i) a set of variables that could be drivers of ownership and including a euro area investment dummy; and (ii) a time dummy to control for the great financial crisis.

Given that, the specification model is given by:

$$OWNERSHIP_{itj} = \beta_0 + \beta_1 Log(TNA)_{it} + \beta_2 ESG_{itj} + \beta_3 TAXES_{ij} + \beta_4 LEGAL_{itj} + \beta_5 PROTECTION_{ij} + \beta_6 RESTRIC_{itj} + \beta_7 FFLOAT_{itj} + \beta_8 DCRISIS_t + \beta_9 DIEURO_{itj} + e_{it} \quad (4.1)$$

$OWNERSHIP_{itj}$ is the weighted average ownership level for fund *i*, in period *t* of the stocks in region *j*.

Portfolio size is measured by the logarithm of the total net assets (TNA) under management. The level of ownership is positively correlated with the TNA meaning that a large investor could own, in principle, a larger stake of the company.

As mentioned in section one, the Corporate Insider Theory advances some important arguments that could explain the level of ownership. Previous literature such

as Giannetti and Simonov (2006) and Leuz et al. (2010), show that on average, foreigners invest less in firms with poor governance due to the lack of transparency and higher level of information asymmetry implying higher monitoring costs for investors. We use a measure of environmental, social and governance (ESG) provided by Bloomberg, considering a total dataset of almost 9,500 companies in 83 countries. As discussed before, a higher quality of Corporate Governance should minimize the risk of agency problems and improve the disclosure of companies increasing the attractiveness for foreign investors. We consider this measure for each stock in the portfolio and then the weighted average at a fund level. The score ranges between 0.1 and 100, where 100 refers to the highest level of Corporate Governance standard.

Besides the monitoring costs, other explicit costs and barriers for foreign investors were considered. As mentioned by Black (1974) or Djankov et al. (2010) or Mishra and Ratti (2013) one of the most relevant transaction costs are the tax differentials, which directly influence the investment destination. To capture this effect, we use the World Bank measure Paying Taxes (TAXES) provided in the Doing Business data. Higher score indicates that the fiscal framework has an important impact on foreign investment, reducing its attractiveness. Once again, it is first measured at a stock level and then calculated the weighted average at a fund level. So, for the cluster of home investment, we impose the value 0 for the TAXES variable given that there are no restrictions to invest in home stocks.

We also control for different legal frameworks with direct impact on minority investors protection. La Porta et al. (1999) states that ownership is more dispersed in countries with better legal protection of minorities. So, in order to capture the minority protection effect, we included two explanatory variables: (i) a dummy (LEGAL) that takes the value 1 if the stock is based in a common law country and 0 otherwise and (ii) the World Bank measure protecting minority investors (PROTECTION) provided in the Doing Business data. Previous literature, e.g. Iushchenko (2012), demonstrates that countries with common law have a higher level of minority shareholders protection. So, it is expected that investors allocate a higher percentage of their wealth in companies domiciled in common law countries. The measure of protection of minority shareholders is provided by Djankov et al. (2008) that focuses on private enforcement mechanisms. As mentioned by previous literature, foreigners invest less in companies with poor outsider

protection so we expect a positive relation between minority protection and foreign ownership[44].

When there are restrictions to cross border capital movements, the ownership level in cross border shares is limited. Even before the introduction of the euro, one of the main achievements of the foundation of a European Union was the progressive removal of barriers to capital flows, which is a necessary condition for financial integration. We use a measure provided by the Economic Freedom Network (RESTRIC) that accounts for the capital controls in the country where the stock is based and ranges between 0 and 10, where 10 translates a fully open market without any kind of capital flows restrictions. So, for the cluster of home investment, we impose the value 10 for the RESTRIC variable given that there are no restrictions to invest in home stocks.

Investors only buy non-domestic assets when they are available to trade, in the time and quantity desired. So, the level of free float and correspondent liquidity level are important drivers of ownership level. Following, e.g., Dahlquist et al. (2003) we use Free Float (FFLOAT), at a stock level. This data is available from Bloomberg.

In order to estimate the effect of a potential structural event over the time frame analyzed, we include a dummy (DCRISIS) that takes the value of 1 if the observation is from the period between 2007 and 2009 and 0 otherwise (financial crisis period).

Lastly, in order to evaluate if ownership levels are different for euro area stocks, we introduce a dummy (DIEURO) that takes the value 1 if the stock is based in the euro area and 0 otherwise.

Table 4.3 summarizes all variables included in the model.

[44] See, for example, Gelos and Wei, 2005, Stulz, 2005, Doidge et al., 2007, Kho et al., 2009, Leuz et al., 2010.

Variable		Source	Description
Fund base			
Total Net Assets	TNA	-	Log of total net assets under management
Stock base			
Corporate Governance Score	ESG	Bloomberg	Range between 0.1 (Min. Score) and 100 (Max. Score)
Fiscal Score	TAXES	World Bank	Position on ranking (Higher – worst)
Dummy Legal	LEGAL	-	1 – Common Law; 0 – other wise
Protecting minority investors	PROTECTION	World Bank	Position on ranking (Higher – worst)
Degree of financial liberalization	RESTRIC	Economic Freedom Network	Capital control measure, 0 (closed) - 10 (fully open)
Free Float	FFLOAT	Bloomberg	Percentage of Free Float shares
Time and Location base			
Dummy Crisis	DCRISIS	-	1 – 2007 to 2009; 0 – other wise
Dummy Euro Area Investment	DIEURO	-	1 – Stock domiciled in Euro Area; 0 – other wise

Table 4.3 - Ownership model - Variable Definition

For some variables (ESG, TAXES, PROTECTION, RESTRIC, FFLOAT), data was only available after March 2003. For the variables PROTECTION and TAXES the data was from the Doing Business 2018 release.

We estimate the model for the period from March 2003 to June 2011 with all explanatory variables described on Table 4.3 with 50,543 observations, pooling quarters, funds and investment destinations.

4.3 Preliminary Results

4.3.1 Summary Statistics – Corporate ownership of European funds

Ownership has three different dimensions: (i) fund location; (ii) investment destination and (iii) time.

4.3.1.1 Corporate ownership over time

Figure 4.1 displays the weighted average corporate ownership and ownership of home stocks for euro area and non-euro area European funds. Ownership is relatively stable across the period most of the time ranging between 0.05% and 0.1%, particularly for euro-area funds. On average, ownership levels are higher for non-euro funds and are

more time-varying over the sample period. These changes somehow reflect changes in sample composition (number and type of funds) over time.

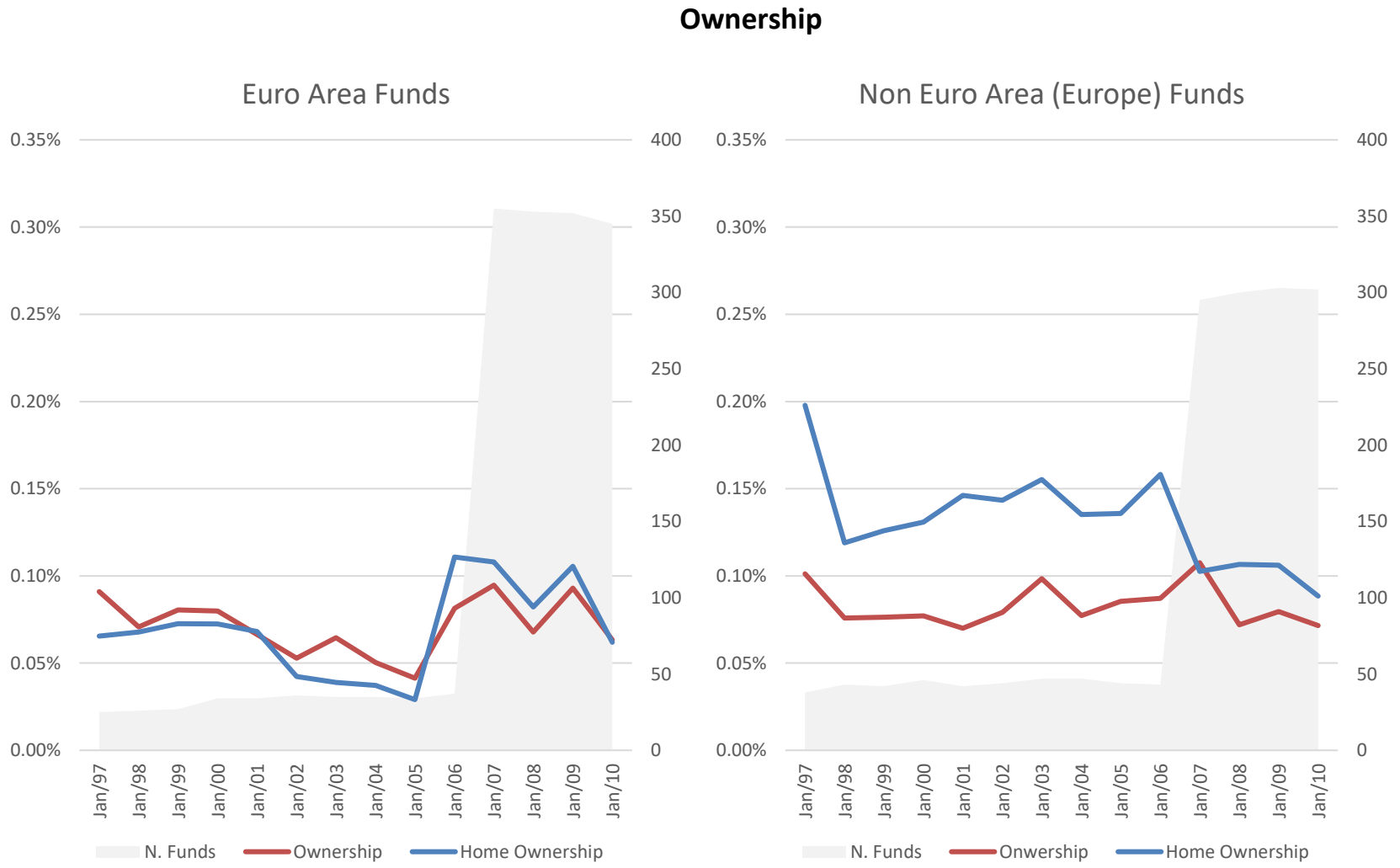


Figure 4.1 - Evolution of Ownership by Region, 1997-2010

For euro area funds, home ownership levels are similar to the overall ownership over the entire sample period, slightly above the overall average at the beginning of the period and then, after 2004, slightly below the overall average. Despite that, over the entire period, funds based inside the euro area show a lower level of home ownership when compared to the level of ownership observed by funds based outside the euro area (in line with the results shown in Table 4.6).

For funds based outside the euro area, we observe a downward trend in ownership over the period. Further, the average ownership in home stocks is in almost all periods, above the overall ownership level.

In sum, preliminary results show the level of ownership is relatively stable over the sample period. When we restrict the analysis to home stocks, we find different patterns for funds based inside the euro area and for funds based in other European countries.

4.3.1.2 Corporate Ownership: Investment Destination

On average, the 834 funds included invested 25.8% in home stocks. 21.1% was invested in the euro area stocks (of which 4.3% in German stocks – excluding German funds' investment in home stocks).

As shown in Table 4.4 and Table 4.5, the wealth allocation is heterogeneous across destinations, showing a pronounced home bias with more than one quarter invested in home stocks, followed by the investments in the euro area. Other important target countries are the US and Japan, with an allocation of, respectively 13.0% and 11.6% of TNA. Investment allocation in Europe outside the euro area (including the UK) was 14.1%. European funds invested less in African and Canadian stocks, allocating less than 1% of their portfolio to either of these regions.

When we look at corporate ownership figures, discrepancies across destinations are smaller. While the investment in EA stocks is dominant when compared to other regions, average corporate ownership is 0.06% for EA stocks, below the overall average level of 0.08%. This difference could be driven by many factors, such as the size and the number of companies funds are investing in or the investors' preferences or investment limitations due to fund investment policy. In our model, we try to handle it by using the weighted average ownership in stocks and including as independent variables the mains drivers of corporate ownership presented by previous literature.

Funds based in the euro area show a rather constant level of corporate ownership across destinations but close to 60% of their wealth is allocated to European stocks. Funds based in other European countries show a slight lower preference for stocks based outside Europe yet there is a higher level of ownership in these regions.

Funds based in countries inside the euro area invest less in home stocks than funds based in countries outside the euro area (16% vs. 33%) and more in euro area stocks (19% vs. 15%). Yet, the "euro bias" is not translated into higher average ownership levels. Despite the difference between the wealth allocated to home and euro area stocks, especially for funds based outside the euro area, the average ownership level is fairly similar in both cases (difference of 3 basis points for home stocks and basis point for euro area stocks).

The larger home bias for funds based outside the euro area is driven by the behavior of investors based in the UK that allocate more than 30% in home stocks. This could be explained by the development of the UK stock market and high number of listings therein (that are not only listings of UK companies). For euro area funds, the results are driven particularly by the behavior of German investors, who allocate only 16% of their wealth to home stocks. Despite this large difference, the average corporate ownership level in home stocks is only 0.2 percentage points higher for UK investors than for other non-euro area investors.

As referred before, the number of stocks invested could explain why there is no correspondence between the investment amounts allocated and the ownership level[45]. That apparent preference for smaller stakes in several companies instead of controlling only one, which La Porta et al. (1999) associates to institutional investors, could stem from expropriation risk. Investors that worship the protection of their investments are more attentive to the legal system, minority rights protection and the rule of law.

The lack of connection between the amounts allocated and ownership levels occurs also for the case of Japanese stocks. Funds based in the euro area invest more 10 percentage points than non-euro area funds in Japan (17.5% vs 7.1%) but the ownership level is similar for all euro and non-euro area funds (0.04%). The higher preference for Japanese stocks is driven by the behavior of funds based in Germany and Ireland.

[45] The average size of the companies in each market also impacts the level of ownership achieved.

With regard to fund location, the discrepancies between investors are more prominent for home and euro area stocks. For home stocks, for example, Greek investors allocate almost 80% of their wealth and in the other extreme, Irish investors allocate only 1.6% of their portfolios to home stocks. Yet, the gap on average ownership level for home stocks is only of 0.02 percentage points. For euro area stocks, excluding home stocks for funds based inside the euro area, we find that Belgian investors allocate 36% of their wealth to stocks of companies in the euro area while Greek investors allocate only 5.5%. Yet, Greek investors show a higher level of ownership (0.09%) in the euro area stocks than Belgian investors (0.04%).

There are few cases where ownership levels are rather different from the global average. Belgian investors have an average ownership of 0.04% but for UK and Asia (excluding Japan) stocks display an average ownership around 0.30%. German investors also show a similar deviation in US stocks with an average ownership of 0.15%, compared to an overall ownership level of 0.07%. These results may be driven by the fact that funds select only a small number of companies to invest.

Overall, we find that the funds in our sample show very different patterns of investment depending on their location and also have different ownership levels across all investment destinations.

PANEL A	EA (455)	NEA (379)	Total (834)
%Home Investment	16.3%	33.0%	25.8%
%Euro Area Investment	19.0%	15.2%	16.8%
%Europe Investment	7.4%	7.7%	7.6%
%Germany Investment	2.9%	5.4%	4.3%
%UK Investment	11.4%	2.8%	6.5%
%US Investment	13.0%	13.0%	13.0%
%Canada Investment	0.9%	0.8%	0.8%
%America Investment	3.8%	4.4%	4.1%
%Africa Investment	0.2%	0.6%	0.4%
%Japan Investment	17.5%	7.1%	11.6%
%Asia Investment	7.7%	9.9%	9.0%
Total	**100%**	**100%**	**100%**

PANEL B	Austria (44)	Belgium (26)	Denmark (41)	UK (282)	Finland (40)	France (30)	Germany (107)	Greece (32)	Ireland (34)
%Home Investment	4.5%	6.5%	9.8%	32.8%	46.7%	35.3%	16.4%	76.9%	1.6%
%Euro Area Investment	22.4%	36.0%	13.1%	16.3%	11.7%	14.8%	18.4%	5.5%	23.9%
%Europe Investment	14.1%	7.9%	12.1%	7.7%	9.9%	6.7%	6.9%	3.5%	7.0%
%Germany Investment	7.4%	11.0%	6.1%	6.1%	4.4%	7.9%	0.0%	1.1%	6.4%
%UK Investment	14.1%	15.8%	10.4%	0.0%	8.5%	10.1%	10.5%	2.1%	17.5%
%US Investment	7.2%	19.1%	16.0%	11.2%	6.6%	12.8%	11.8%	5.5%	10.2%
%Canada Investment	0.6%	0.3%	0.6%	0.7%	0.2%	1.9%	1.0%	0.0%	0.3%
%America Investment	1.1%	0.2%	9.9%	5.2%	3.5%	3.5%	2.8%	0.0%	0.7%
%Africa Investment	0.2%	0.1%	0.2%	0.7%	0.1%	0.1%	0.1%	0.4%	0.2%
%Japan Investment	1.0%	1.8%	4.7%	8.4%	0.5%	3.3%	25.4%	1.2%	23.0%
%Asia Investment	27.4%	1.4%	17.2%	10.7%	7.9%	3.6%	6.8%	3.9%	9.0%
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

PANEL B (cont.)	Italy (20)	Luxembourg (25)	Netherlands (39)	Portugal (26)	Spain (32)	Sweden (51)	Switzerland (5)
%Home Investment	16.0%	3.4%	9.7%	2.4%	32.5%	41.4%	3.2%
%Euro Area Investment	16.5%	22.7%	16.0%	24.0%	27.8%	11.8%	14.5%
%Europe Investment	19.2%	9.8%	6.5%	4.6%	6.0%	7.1%	2.3%
%Germany Investment	6.3%	7.9%	4.9%	7.8%	10.0%	2.7%	5.6%
%UK Investment	12.8%	13.0%	10.9%	16.3%	11.5%	7.2%	55.8%
%US Investment	14.8%	27.9%	19.9%	9.5%	9.7%	19.6%	1.4%
%Canada Investment	1.2%	0.6%	0.9%	2.4%	1.0%	0.8%	0.2%
%America Investment	0.1%	0.3%	13.7%	20.0%	0.2%	0.6%	3.3%
%Africa Investment	0.4%	0.1%	0.7%	0.6%	0.1%	0.1%	1.1%
%Japan Investment	4.9%	6.5%	3.7%	5.8%	0.6%	3.5%	0.4%
%Asia Investment	7.8%	7.9%	13.1%	6.4%	0.6%	5.1%	12.2%
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

Table 4.4 - Amount allocated by Domicile and Region – Average for the period between June 1997 and June 2011 for 834 funds
Figures in parentheses are the number of funds.

PANEL A	EA (455)	NEA (379)	Total (834)
Home Ownership	0.08%	0.11%	0.10%
Euro Area Ownership	0.05%	0.07%	0.06%
Europe Ownership	0.05%	0.07%	0.06%
Germany Ownership	0.02%	0.05%	0.04%
UK Ownership	0.09%	0.02%	0.05%
US Ownership	0.11%	0.08%	0.10%
Canada Ownership	0.05%	0.11%	0.08%
America Ownership	0.05%	0.04%	0.05%
Africa Ownership	0.01%	0.05%	0.04%
Japan Ownership	0.04%	0.04%	0.04%
Asia Ownership	0.06%	0.09%	0.08%
Ownership	**0.08%**	**0.08%**	**0.08%**

PANEL B	Austria (44)	Belgium (26)	Denmark (41)	UK (282)	Finland (40)	France (30)	Germany (107)	Greece (32)	Ireland (34)
Home Ownership	0.05%	0.07%	0.07%	0.09%	0.08%	0.10%	0.07%	0.10%	0.08%
Euro Area Ownership	0.06%	0.07%	0.04%	0.07%	0.03%	0.10%	0.05%	0.09%	0.04%
Europe Ownership	0.04%	0.03%	0.13%	0.07%	0.05%	0.08%	0.05%	0.02%	0.04%
Germany Ownership	0.05%	0.03%	0.05%	0.05%	0.02%	0.07%	-	0.01%	0.05%
UK Ownership	0.07%	0.30%	0.07%	-	0.05%	0.08%	0.08%	0.06%	0.05%
US Ownership	0.04%	0.06%	0.06%	0.08%	0.02%	0.14%	0.15%	0.13%	0.04%
Canada Ownership	0.01%	0.01%	0.02%	0.13%	0.01%	0.09%	0.04%	0.00%	0.01%
America Ownership	0.00%	0.01%	0.04%	0.05%	0.02%	0.17%	0.02%	0.00%	0.01%
Africa Ownership	0.00%	0.00%	0.01%	0.05%	0.00%	0.01%	0.01%	0.01%	0.01%
Japan Ownership	0.00%	0.01%	0.04%	0.05%	0.00%	0.06%	0.04%	0.02%	0.03%
Asia Ownership	0.04%	0.29%	0.06%	0.10%	0.04%	0.07%	0.05%	0.03%	0.03%
Ownership	**0.05%**	**0.04%**	**0.06%**	**0.09%**	**0.07%**	**0.12%**	**0.07%**	**0.09%**	**0.06%**

PANEL B (cont)	Italy (20)	Luxembourg (25)	Netherlands (39)	Portugal (26)	Spain (32)	Sweden (51)	Switzerland (5)
Home Ownership	0.02%	0.02%	0.13%	0.02%	0.05%	0.22%	0.04%
Euro Area Ownership	0.02%	0.03%	0.06%	0.08%	0.03%	0.06%	0.08%
Europe Ownership	0.05%	0.06%	0.05%	0.12%	0.04%	0.05%	0.08%
Germany Ownership	0.02%	0.05%	0.05%	0.19%	0.05%	0.06%	0.02%
UK Ownership	0.02%	0.03%	0.13%	0.18%	0.05%	0.06%	0.09%
US Ownership	0.04%	0.04%	0.05%	0.06%	0.03%	0.09%	0.09%
Canada Ownership	0.02%	0.01%	0.10%	0.03%	0.00%	0.05%	0.03%
America Ownership	0.00%	0.02%	0.20%	0.02%	0.01%	0.02%	0.04%
Africa Ownership	0.02%	0.01%	0.05%	0.00%	0.00%	0.08%	0.08%
Japan Ownership	0.02%	0.03%	0.03%	0.00%	0.04%	0.03%	0.01%
Asia Ownership	0.02%	0.03%	0.06%	0.04%	0.01%	0.07%	0.09%
Ownership	**0.04%**	**0.04%**	**0.11%**	**0.09%**	**0.03%**	**0.07%**	**0.08%**

Table 4.5 - Ownership by Domicile and Region – Average for the period between June 1997 and June 2011 for 834 funds
Figures in parentheses are the number of funds.

To test if fund location impacts ownership, we perform a t-test of differences in means between funds based in the euro area countries and funds based in other European countries. Table 4.6 shows the results which indicate that we reject the null that the difference in means is zero, at the 1% level, for all variables.

Clusters	Groups	Mean Difference	p-value
Ownership (all stocks)	Euro Area vs. Non Euro Area funds	-0.01%	0.000
Home Ownership	Euro Area vs. Non Euro Area funds	-0.03%	0.000
Non-Home Ownership	Euro Area vs. Non Euro Area funds	-0.08%	0.000
Euro Area Ownership[46]	Euro Area vs. Non Euro Area funds	-0.01%	0.000
Non-Euro Area Ownership	Euro Area vs. Non Euro Area funds	-0.09%	0.000

Table 4.6 - Ownership Differences between Euro area and non-Euro area funds

The results show higher ownership levels for funds based outside the euro area which in part stems from the fact that these funds have higher TNAs. The gap is specially noticed in the investment of non-euro area stocks.

In order to understand if fund size (measured by the total net assets – TNA – that is the value under management) determines the ownership level, we split our dataset by fund size (TNA below or above the median). Table 4.7 shows that, as expected, the weighted average total ownership for funds with TNA above the median is 0.03 percentage points higher.

	Mean [Weighted Average]	Median [Weighted Average]	Std. Deviation
Funds w/TNA below Median	0.05%	0.03%	0.06%
Funds w/TNA above Median	0.08%	0.06%	0.08%
Total	**0.08%**	**0.05%**	**0.08%**

Table 4.7 - Ownership split by TNA

For home stocks investment, the difference in corporate ownership between larger and smaller funds is 0.05 percentage points, as shown in Table 4.8.

These figures suggest ownership levels are, as expected, limited by fund size. In fact, for smaller funds, we show similar averages of total ownership and average

[46] Weighted average ownership including German stocks.

ownership in domestic assets (0.05%). This was already shown in Table 4.1, where funds based inside the euro area, which have a lower average TNA (662M for euro area funds vs. 951M for funds based within other European countries), have lower home ownership.

	Mean [Weighted Average]	Median [Weighted Average]	Std. Deviation
Funds w/TNA below Median	0.05%	0.02%	0.07%
Funds w/TNA above Median	0.10%	0.06%	0.11%
Total	**0.10%**	**0.06%**	**0.11%**

Table 4.8 - Home Stocks Ownership split by TNA

Lastly, as far as the euro area stocks are concerned, we notice that fund size does not seem to be a relevant driver of the levels of ownership. Table 4.9 shows the test results.

	Mean [Weighted Average]	Median [Weighted Average]	Std. Deviation
Funds w/TNA below Median	0.06%	0.02%	0.73%
Funds w/TNA above Median	0.06%	0.04%	0.11%
Total	**0.06%**	**0.04%**	**0.25%**

Table 4.9 - Euro Area Stocks Ownership split by TNA

These results are consistent with the figures in Table 4.6: while euro area funds display euro bias, differences in corporate ownership of euro area stocks between funds based inside and outside the euro area (larger funds) are not significant.

4.3.2 Summary Statistics – Explanatory Variables

Table 4.10 presents the main statistics of the explanatory variables considered in the ownership level model.

The European mutual funds in our sample show, on average, investment preferences for stocks associated with high quality of corporate governance and good protection of minority shareholders but there is some variation across funds. Additionally, as expected, funds invest in stocks located in countries that do not have barriers as

suggested by the high level of the *RESTRIC* variable. The level of *FFLOAT* also reflects that investors invest more in companies that are not controlled by one major shareholder.

Variables	Mean	Median	Minimum	Maximum	Std. Deviation
LOG(TNA)	2.71	2.76	-0.04	4.65	0.52
ESG	46.34	48.57	0.28	66.96	8.56
TAXES	37.86	36.00	0.00	184.00	33.07
LEGAL	0.29	0.04	0.00	1.00	0.43
PROTECTION	48.15	44.26	0.01	146.00	25.18
RESTRIC	7.92	7.69	0.00	10.00	1.06
FFLOAT	68.42	72.37	0.01	100.00	19.05

Table 4.10 - Summary Statistics for Explanatory Variables – Average for the period between March 2003 and June 2011

4.3.3 Correlation

Table 4.11 shows the correlation matrix between the independent variables included in the model.

	LOG(TNA)	ESG	TAXES	LEGAL	PROTECTION	RESTRIC	FFLOAT	DCRISIS	DIEURO
LOG(TNA)	1								
ESG	-0.08	1							
TAXES	0.08	-0.27	1						
LEGAL	0.06	0.41	-0.27	1					
PROTECTION	0.01	-0.31	0.20	-0.62	1				
RESTRIC	-0.06	0.24	-0.62	0.19	-0.12	1			
FFLOAT	-0.01	0.46	-0.32	0.48	-0.19	0.34	1		
DCRISIS	0.05	-0.09	0.01	0.05	0.00	-0.01	0.07	1	
DIEURO	0.00	0.15	0.10	-0.12	0.08	-0.22	-0.34	0.00	1

Table 4.11 - Correlation between Variables – Average for the period between March 2003 and June 2011

There are two cases where the correlation coefficient between the two variables is above 0.5: the correlation between the limitation of cross border flows (RESTRIC) and taxes and the correlation between protection variable and the legal system variable.

The correlation between the protection variable and the legal system variable shows the expected result, given that common law systems are expected to be more efficient in the protection of minority investors.

In the two additional cases with correlation coefficient above 0.45, we find another expected result, the correlation between corporate governance score and free float. The presence of an insider shareholder tends to increase the risk of agency problems, reducing the corporate governance score. Given that common law systems are more protective for minority investors, a positive correlation between legal system and free float is therefore in line with the expected results.

We address the concerns of multicollinearity later on by conducting some robustness tests.

4.4 Empirical Results and Analysis

This section shows our main empirical results. We used EGLS panel regression estimation technique with cross-section (mutual funds) weights[47]. Ownership regression results are presented for the full sample and for the two subsamples: funds based in countries inside the euro area (EA) and funds based in other European countries (NEA). Comparing the results of the two subsamples is informative, to find out if there are relevant differences between funds based in countries inside and outside the euro area.

4.4.1 Ownership Model – Full Sample and Euro and Non Euro Area Funds

Table 4.12 illustrates the results for the Ownership variable.

[47] EGLS application with mutual funds weights is supported by the result of the Hausman test which shows that random effects should not be used.

	Ownership	Ownership	Ownership
	2003-2011	2003-2011	2003-2011
	Total	EA	NEA
Intercept	0.0328***	-0.0052**	0.1625***
LOG(TNA)	0.0157***	0.0073***	0.0414***
ESG	-0.0000	-0.0001***	0.0002***
TAXES	0.0000	0.0002***	-0.0003***
LEGAL	0.0314***	0.0230***	0.0211***
PROTECTION	-0.0004***	-0.0002***	-0.0006***
RESTRIC	-0.0022***	0.0049***	-0.0290***
FFLOAT	0.0003***	0.0001***	0.0008***
DCRISIS	0.0014***	0.0082***	0.0033***
DIEURO	0.0004	0.0082***	-0.0305***
Adjusted R-squared	54.84%	17.06%	88.72%
Observations	50,543	23,540	27,003

***significant at 1% level
**significant at 5% level
*significant at 10% level

Table 4.12 - Total Ownership – Regression estimates

In general, the results show a reasonable quality of adjustment and most of the estimated parameters are significant at the 1% level.

In line with the preliminary tests performed in section 4.3.1.2, the ownership is positively related to portfolio size.

The severeness of capital controls (*RESTRIC*) seems to have mixed effects on the level of corporate ownership. The effect is not clear especially when we split the sample between funds based inside the euro area and in other European countries. The average ownership level is lower when barriers are smaller which may eventually indicate an opportunity to enhance the level of portfolio diversification, through the investment in more stocks.

As far as the Corporate Insider Theory is concerned, we also have mixed results. As expected, funds have higher ownership levels in stocks with higher Free Float and of companies located in countries where minority investors' protection is higher and with

common law systems. However, the estimated parameter associated with the proxy of Corporate Governance (*ESG*) has the opposite sign, but it is not statistically significant.

Results are more informative when we split our dataset in two subsamples; funds based within the euro area and funds based in other European countries.

Funds based outside the euro area show an opposite reaction (when compared to the ones bases inside) to corporate governance score and capital controls, with high ownership in stocks with higher corporate governance scores, as expected. However, contrarily to expectations ownerships is positively associated with barriers to capital flow.

Results suggest that the financial crisis led to a slightly average increase of ownership levels but this parameter is not significant for funds based outside the euro area. Davydoff et al. (2013) also refers that financial crises did not impose a material change on ownership structure.

Our figures also show that ownership is higher in euro area stocks for funds based in the euro area.

Overall, after controlling for the main drivers of ownership, provided by previous literature, we understand that location matters as shown by the different results obtained when we split our sample. We find different reactions to many of the drivers discussed before which may translate different preferences but also suggest imperfect integration between the markets.

4.4.1.1 Excluding Home Stocks

As shown in Table 4.4 funds allocate a relevant wealth in home stocks. Those stocks are the most relevant in the holdings weighting more than 25% on average and are even more important for investors based outside the euro, more than 30%.

Table 4.13 illustrates the results for the Ownership variable for a subsample of observations, excluding Home Stocks.

	Ownership w/o Home Stocks	Ownership w/o Home Stocks	Ownership w/o Home Stocks
	2003-2011	**2003-2011**	**2003-2011**
	Total	**EA**	**NEA**
Intercept	-0.0193***	-0.0108***	0.1350***
LOG(TNA)	0.0136***	0.0072***	0.0181***
ESG	0.0001***	-0.0004***	0.0001***
TAXES	0.0002***	0.0003***	-0.0002***
LEGAL	0.0626***	0.0299***	0.0336***
PROTECTION	-0.0004***	-0.0001***	-0.0006***
RESTRIC	0.0071***	0.0075***	-0.0134***
FFLOAT	-0.0001***	0.0000	0.0002***
DCRISIS	0.0067***	0.0055***	0.0037***
DIEURO	-0.0075***	0.0076***	-0.0246***
Adjusted R-squared	73.22%	27.89%	37.39%
Observations	43,288	20,153	23,135

***significant at 1% level
**significant at 5% level
*significant at 10% level

Table 4.13 - Total Ownership - subsample without Home Stocks

In general, we find similar results to the ones for the full sample. Yet, there are a few differences that are worth to highlight.

When investing abroad, funds seem to react differently to the level of free float. As expected, results in the section 4.4.1 show that funds increase their average ownership level if the assets are available to trade, in the time and quantity desired. Additionally, a higher level of free float could be associated to less agency problems When we exclude home stocks, surprisingly, higher ownership is now associated with lower free float.

In regard to the parameter associated with Corporate Governance Score (*ESG*), the estimate has now the expected sign. When investing abroad, the average level of ownership increases in stocks with better corporate governance scores.

In section 4.4.1, lower barriers were associated with lower average ownership, contrarily to what was expected. We now observe that, when we exclude home stocks, lower capital controls are associated with higher levels of ownership, as expected.

4.4.2 Ownership in Euro area stocks

Our previous tests show how investors' location influences corporate ownership. To evaluate whether ownership decisions of euro area stocks are driven by similar factors, we compare the regression results for euro area and non-euro area funds in regard to their ownership of euro area stocks. We build two subsamples of euro area holdings by funds domiciled inside the euro area ("domestic" funds) and funds domiciled in other European countries ("foreign" funds). Table 4.14 shows the results.

	Euro Area Stocks Ownership	
	2003-2011	**2003-2011**
	EA ("domestic" funds)	**NEA ("foreign" funds)**
Intercept	0.4192***	-0.0305
LOG(TNA)	-0.0277***	0.0373***
ESG	-0.0014***	0.0003***
TAXES	-0.0011***	-0.0006***
LEGAL	-0.0200***	0.0422***
PROTECTION	0.0011***	0.0004***
RESTRIC	-0.0380***	-0.0033
FFLOAT	0.0010***	-0.0003***
DCRISIS	0.0033	-0.0013**
Adjusted R-squared	53.28%	46.22%
Observations	4,505	4,365

***significant at 1% level
**significant at 5% level
*significant at 10% level

Table 4.14 - Euro Area Stocks Ownership

Overall, the results show a reasonable quality of adjustment along with a good level of significance for most of the variables included in the model.

Yet the drivers of ownership for "domestic" and "foreign" investors are not alike and parameter estimates are not consistent. The difference could be informative if we assume that in a perfect scenario of integration euro area funds and foreign funds should be affected by the same factors. Moreover, as discussed above, corporate insider theory

would suggest that institutional investors should react similarly to proxies of corporate governance quality, regardless of their location.

The first unexpected result is the different impact of the fund size. Large euro area funds do not seem to favor large ownership in euro area stocks while foreign investors seem to prefer to hold higher stakes of the euro area companies.

Results also suggest that funds are differently affected by corporate governance scores, legal system, and free float. As expected, and particularly, in the case of foreign investors that face higher monitoring costs, they seem to choose to invest in countries where their rights are more protected. In fact, we observe higher level of ownership in stocks based in common law regimes and with higher corporate governance scores. The responsiveness to free float is however against the expected results. Foreign investors' ownership is higher in stocks with low free float. On the other hand, euro area funds corporate ownership is positively associated with protection and free float but negatively related with corporate governance scores.

Finally, the results suggest that the impact of the financial crisis did not impact the corporate ownership decisions of euro area funds but reduced the level of ownership for other foreign funds.

So, overall the differences between the two groups show that the determinants of ownership of euro area stocks are not completely shared by the two groups. This result suggests that markets are not fully integrated.

4.4.3 Robustness Tests

We perform some additional tests to assess the robustness of the empirical results presented above.

Our sample is balanced between funds based inside the euro area (56%) and funds based in other European countries (44%). However, most of the funds based in other European countries are based in the UK (and represent one third of the total sample). We rerun all models excluding all funds based in the UK to find out if the results were not

driven by the behavior of this subset of funds. The results, available upon request, hold when we exclude UK funds.

Given that, due to data limitations, we assumed that *PROTECT* (Protecting minority investors) was constant through the entire sample period. The estimates for the remaining explanatory variables, when we drop this variable, are robust.

Regarding the variables related to the Corporate Insider Theory, as shown in the previous section, the estimates for Corporate Governance Score (*ESG*) are unexpected and contradict the ones obtained for minority investors' protection, legal system and free float. So, in order to test if this variable could bias the results, we run alternative specifications of the model excluding *ESG* and/or *PROTECT*. The results, available upon request, show that the main conclusions persist and are not significantly affected by removing or adding those variables in the model.

Lastly, we run our model excluding, one by one, *LEGAL, FFLOAT and TAXES* to overcome potential multicollinearity issues. The results, available upon request, show that overall the results are similar to the base model specification.

4.5 Summary and Main Conclusions

This chapter proposes a new and explanatory approach to better understand the evolution of financial market integration. While preferences play an important role in investment allocation and corporate ownership levels, cross-border corporate ownership levels may also reflect the degree of financial market integration. We analyze the quarterly holdings of a large set of European investment funds, comparing euro area and non-euro area funds, and evaluate the role of corporate insider holding implications and other controls to explain the time series and cross-sectional variability of corporate ownership levels.

The empirical specification we propose includes two different sets of variables: (i) arguments that have been put forward by previous literature that explain corporate ownership and (ii) a set of dummies to control for the impact of the recent financial crisis and for euro area investments.

Our findings show that, as expected, there is a direct correlation between the size of the portfolio and corporate ownership level.

We first document that there is no correspondence between the relative amounts invested and the ownership level in one particular region. While investors based inside the euro area heavily invest in euro area assets (including home assets), more than non-euro area funds, the level of corporate ownership in euro area stocks is similar for the two groups of funds.

Overall, we find that the results are aligned with the implications of corporate insider theory, but there are some inconsistent results when we run the same specification for subsamples of euro area and non-euro area funds and subsamples of holdings. In our base model, ownership is positively associated with free float, with stocks based in common law countries and better protection of minority shareholders. Yet the impact of Corporate Governance Scores (*ESG*) is negative for the full sample and subsamples of euro area and non-euro area funds, when we exclude the holdings of home stocks, we get the right sign for the *ESG* parameter but the estimates for the other variables are not always consistent with the expected results.

Overall results are mixed and, even if we observe that the determinants of corporate ownership are not the same for euro area and non-euro area funds, it is difficult to draw clear conclusions with regard to financial market integration.

5. CONCLUSION

This study presents a multi approach analysis to financial market integration in Europe over the last two decades.

The main purpose of this research is to provide further evidence on the level and drivers of financial integration since the euro introduction and how the process has been impacted by the recent financial crisis. We focus on the information conveyed by the portfolio returns and the holdings of investment funds.

ICAPM, under perfect financial market integration, dictates that optimal allocation is achieved holding the world market portfolio. In other words, deviations from the world market portfolio could thus reflect that markets are not fully integrated.

We contribute to the literature by providing a thorough study institutional investors' portfolios, employing both return-based and holdings-based approaches to evaluate financial integration over time and across countries. In particular we propose a novel return-based approach to measure financial market integration; we evaluate how home and cross-border holdings and corporate ownership have changed in recent years and across investment funds based in different European countries; and we study and test the implications of home bias and corporate insider theory for financial market integration.

Our multi approach analysis allows us to propose simple and easier ways to better understand and measure financial market integration. In our return-based approach we present a new specification model based on a very well adopted model initially proposed by Sharpe (1992), in which we replace the original assets classes for geographic benchmarks. The advantages of our model are the easiest application, less data or computational requirements and more important, the fact that it has proved to be robust.

The main insights from the evidence we present in this thesis are:

1. The level of financial integration is higher inside the euro area than in other European countries;

2. The euro introduction was followed by an intensification of the financial market integration that led to a portfolio reallocation by euro area investors, that have shifted a significant part of their holdings from domestic (home bias) to euro area stocks (euro bias);
3. Our results are consistent with the phenomenon of local bias described by previous literature, indicating that euro area investors, with the increase of the financial market integration, seem to behave as euro area investors;
4. Inside the euro area, there are different levels of integration with investors based in countries more affected by the financial crisis, such as Portugal, Italy, Greece and Spain, showing a higher preference for domestic stocks;
5. The impact of the last financial crisis is not so clear but some adjustments in the portfolio allocation are noticed pointing to a setback on the level of financial market integration previously achieved;
6. At the industry level, after the outbreak of the financial crisis there was shift from financial to energy or health care stocks;
7. Additionally, investors based outside the euro area show an over preference for non-tradable industries which along with a higher level of home bias, suggest a lower level of financial integration;
8. Average corporate ownership levels were relatively stable over recent times in most European countries; yet the determinants of corporate ownership are not always the same for euro area and non-euro area funds.

The analysis we conduct has several shortcomings. The most relevant has to do with data limitations. More data for the period prior to the introduction of the euro would be very helpful to better assess the euro introduction impact and to capture all the relevant portfolio shifts. It is likely that portfolio allocation occurred well in advance the introduction of the euro. The euro introduction was a long process, formally established by the Maastricht Treaty in 1992. So, since that our earliest available data is from June 1997, any adjustments before that are not captured. Other potential data limitation is the utilization of datasets that are dependent from institutional investors contributions and do not result from direct data collection from an independent entity. In periods of worse performance, investors could be tempted to avoid to correctly disclose their positions, leading to data missing points or even worse data repetition. Lastly, some proxies used to

capture the drivers presented by Corporate Insider Theory were recently created meaning some limitations on historical data.

Moreover, our sample period does not cover the end of the great financial crisis and it is very likely that several ongoing processes in Europe and in the Euro area, such the banking union, the merge trend in negotiation platforms (NYSE, Euronext and Deutsche Börse), the independent movements such as Brexit or the declaration of the independence in Catalonia, are influencing financial integration. Therefore, future work, as soon as data is available, is necessary to reassess the level of integration in recent years and how those ongoing processes impacted the already segmented markets, especially inside the euro area.

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